SUPLEMENT C

19) In which of the following has LP been applied successfully?
A) minimizing distance traveled by school buses carrying children
B) minimizing 911 response time for police patrols
C) minimizing labor costs for bank tellers while maintaining service levels
D) determining the distribution system for multiple warehouses to multiple destinations
E) all of the above
Answer: E
Diff: 1
Topic: Why use linear programming?
Objective: no LO

20) Which of the following represents valid constraints in linear programming?
A) $2X \geq 7X*Y$
B) $2X * 7Y \geq 500$
C) $2X + 7Y \geq 100$
D) $2X^2 + 7Y \geq 50$
E) All of the above are valid linear programming constraints.
Answer: C
Diff: 2
Topic: Requirements of a linear programming problem
Objective: no LO

21) Which of the following is not a requirement of a linear programming problem?
A) an objective function, expressed in terms of linear equations
B) constraint equations, expressed as linear equations
C) an objective function, to be maximized or minimized
D) alternative courses of action
E) for each decision variable, there must be one constraint or resource limit
Answer: E
Diff: 2
Topic: Requirements of a linear programming problem
Objective: no LO

22) In linear programming, a statement such as "maximize contribution" becomes a(n)
A) constraint
B) slack variable
C) objective function
D) violation of linearity
E) decision variable
Answer: C
Diff: 2
Topic: Formulating linear programming problems
Objective: LO-Module B-1

23) If cars sell for $500 profit and trucks sell for $300 profit which of the following represents the objective function?
A) Maximize = 500C+300T
B) Minimize = 500C + 300T
C) Maximize = 500C — 300T
D) Minimize = 300T- 500C
E) None of the above
Answer: A
Diff: 2
Topic: Formulating linear programming problems
Objective: LO-Module B-1

34) What combination of x and y will yield the optimum for this problem?
Maximize $3x + $15y, subject to (1) $2x + 4y \leq 12$ and (2) $5x + 2y \leq 10$.
A) x = 2, y = 0
B) x = 0, y = 3

C) x = 0, y = 0
D) x = 1, y = 5
E) none of the above
Answer: B
Diff: 2
Topic: Graphical solution to a linear programming problem
AACSB: Analytic Skills
Objective: LO-Module B-3

35) What combination of x and y will yield the optimum for this problem?
Minimize \$3x + \$15y, subject to (1) $2x + 4y \leq 12$ and (2) $5x + 2y \leq 10$.
A) x = 2, y = 0
B) x = 0, y = 3
C) x = 0, y = 0
D) x = 1, y = 5
E) none of the above
Answer: C
Diff: 2
Topic: Graphical solution to a linear programming problem
AACSB: Analytic Skills
Objective: LO-Module B-3

36) What combination of a and b will yield the optimum for this problem?
Maximize \$6a + \$15b, subject to (1) $4a + 2b \leq 12$ and (2) $5a + 2b \leq 20$.
A) a = 0, b = 0
B) a = 3, b = 3
C) a = 0, b = 6
D) a = 6, b = 0
E) cannot solve without values for a and b
Answer: C
Diff: 2
Topic: Graphical solution to a linear programming problem
AACSB: Analytic Skills
Objective: LO-Module B-3

41) A linear programming problem contains a restriction that reads "the quantity of X must be at least three times as large as the quantity of Y." Which of the following inequalities is the proper formulation of this constraint?
A) $3X \geq Y$
B) $X \leq 3Y$
C) $X + Y \geq 3$
D) $X - 3Y \geq 0$
E) $3X \leq Y$
Answer: D
Diff: 2
Topic: Formulating linear programming problems
AACSB: Analytic Skills
Objective: LO-Module B-1

42) A linear programming problem contains a restriction that reads "the quantity of Q must be no larger

than the sum of R, S, and T." Formulate this as a constraint ready for use in problem solving software.
A) $Q + R + S + T \leq 4$
B) $Q \geq R + S + T$
C) $Q - R - S - T \leq 0$
D) $Q / (R + S + T) \leq 0$
E) none of the above
Answer: C
Diff: 2
Topic: Formulating linear programming problems
AACSB: Analytic Skills
Objective: LO-Module B-1

43) A linear programming problem contains a restriction that reads "the quantity of S must be no less than one-fourth as large as T and U combined." Formulate this as a constraint ready for use in problem solving software.
A) $S / (T + U) \geq 4$
B) $S - .25T - .25U \geq 0$
C) $4S \leq T + U$
D) $S \geq 4T / 4U$
E) none of the above
Answer: B
Diff: 2
Topic: Formulating linear programming problems
AACSB: Analytic Skills
Objective: LO-Module B-1

44) A firm makes two products, Y and Z. Each unit of Y costs $10 and sells for $40. Each unit of Z costs $5 and sells for $25. If the firm's goal were to maximize profit, the appropriate objective function would be
A) maximize $40Y = $25Z
B) maximize $40Y + $25Z
C) maximize $30Y + $20Z
D) maximize 0.25Y + 0.20Z
E) none of the above
Answer: C
Diff: 2
Topic: Formulating linear programming problems
AACSB: Analytic Skills
Objective: LO-Module B-1

45) A linear programming problem has three constraints: $2X + 10Y \leq 100$ $4X + 6Y \leq 120$ $6X + 3Y \leq 90$
What is the largest quantity of X that can be made without violating any of these constraints?
A) 50
B) 30
C) 20
D) 15
E) 10
Answer: D
Diff: 2
Topic: Graphical solution to a linear programming problem
AACSB: Analytic Skills
Objective: LO-Module B-3

46) Suppose that an iso-profit line is given to be X+Y=15. What would be the profit made from producing 20X and 10Y?
A) 15
B) 30
C) 0
D) 20X and 10Y is not a feasible solution.
E) Unable to determine
Answer: B
Diff: 3
Topic: Graphical solution to a linear programming problem
Objective: LO-Module B-2

47) Suppose that an iso-profit line is given to be X+Y=10. Which of the following represents another iso-profit line for the same scenario?
A) X+Y=15
B) X-Y=10
C) Y-X=10
D) 2X+Y=10
E) None of the above
Answer: A
Diff: 2
Topic: Graphical solution to a linear programming problem
Objective: LO-Module B-2

51) In sensitivity analysis, a zero shadow price (or dual value) for a resource ordinarily means that
A) the resource is scarce
B) the resource constraint was redundant
C) the resource has not been used up
D) something is wrong with the problem formulation
E) none of the above
Answer: C
Diff: 3
Topic: Sensitivity analysis
Objective: LO-Module B-4

52) A shadow price (or dual value) reflects which of the following in a maximization problem?
A) the marginal gain in the objective realized by subtracting one unit of a resource
B) the market price that must be paid to obtain additional resources
C) the increase in profit that would accompany one added unit of a scarce resource
D) the reduction in cost that would accompany a one unit decrease in the resource
E) none of the above
Answer: C
Diff: 2
Topic: Sensitivity analysis
Objective: LO-Module B-4

53) A linear programming problem has three constraints: $2X + 10Y \leq 100$ $4X + 6Y \leq 120$ $6X + 3Y \geq 90$
What is the largest quantity of X that can be made without violating any of these constraints?
A) 50
B) 30
C) 20
D) 15
E) 10
Answer: B
Diff: 2
Topic: Graphical solution to a linear programming problem
AACSB: Analytic Skills
Objective: LO-Module B-3

54) A maximizing linear programming problem with variables X and Y and constraints C1, C2, and C3 has been solved. The *dual values* (not the solution quantities) associated with the problem are X = 0, Y = 0, C1 = $2, C2 = $0.50, and C3 = $0. Which statement below is **false**?
A) One more unit of the resource in C1 would add $2 to the objective function value.
B) One more unit of the resource in C2 would add one more unit each of X and Y.
C) The resource in C3 has not been used up
D) The resources in C1 and in C2, but not in C3, are scarce.
E) All of the above are true.
Answer: B
Diff: 3
Topic: Sensitivity analysis
AACSB: Analytic Skills
Objective: LO-Module B-4

55) A maximizing linear programming problem with variables X and Y and constraints C1, C2, and C3 has been solved. The *dual values* (not the solution quantities) associated with the problem are X = 0, Y = $10, C1 = $2, C2 = $0.50, and C3 = $0. Which statement below is **true**?
A) One more unit of the resource in C1 would reduce the objective function value by $2.
B) One more unit of the resource in C2 would add one-half unit each of X and Y.
C) The resources in C1 and C2 have not been used up.
D) The optimal solution makes only X; the quantity of Y must be zero.
E) All of the above are true.
Answer: D
Diff: 3
Topic: Sensitivity analysis
AACSB: Analytic Skills
Objective: LO-Module B-4

56) A linear programming maximization problem has been solved. In the optimal solution, two resources are scarce. If an added amount could be found for only one of these resources, how would the optimal solution be changed?
A) The shadow price of the added resource will rise.
B) The solution stays the same; the extra resource can't be used without more of the other scarce resource.
C) The extra resource will cause the value of the objective to fall.
D) The optimal mix will be rearranged to use the added resource, and the value of the objective function will rise.
E) none of the above
Answer: D
Diff: 2
Topic: Sensitivity analysis
AACSB: Analytic Skills
Objective: LO-Module B-4

57) Sensitivity analysis helps to
A) see the value of increased scarce resources
B) determine even better solutions
C) see the impact of parameter changes
D) A and C
E) A, B, and C
Answer: D
Diff: 2
Topic: Sensitivity analysis
Objective: LO-Module B-4

58) Suppose that the shadow price for assembly time is $5/hour. If all assembly hours were used under the initial LP solution and workers normally make $4/hour but can work overtime for $6/hour what should management do?
A) Nothing, the optimal solution is present.
B) decrease available hours for assembly time
C) increase available hours for assembly time
D) not enough information
E) Either A or C will result in larger profits than B.
Answer: A
Diff: 2
Topic: Sensitivity analysis
Objective: LO-Module B-4

59) The difference between minimization and maximization problems is that
A) minimization problems cannot be solved with the corner-point method
B) maximization problems often have unbounded regions
C) minimization problems often have unbounded regions
D) minimization problems cannot have shadow prices
E) None of the above are true.
Answer: C
Diff: 2
Topic: Solving minimization problems
Objective: LO-Module B-5

CHAPTER 12
MULTIPLE CHOICE

1. All of the following are <u>limitations</u> of high levels of work-in-process and finished goods inventory <u>except</u>
   a. More difficult to change product lines
   b. Acts as a buffer between work stations
   c. Limits flexibility to meet changing customer needs
   d. Hides problems

   ANS: B

2. Inventory that has been ordered but not yet received and is in transit is called
   a. Raw materials
   b. Pipeline
   c. Anticipation
   d. Cycle

   ANS: B

3. _____ is inventory that results from purchasing or producing in larger lots than are needed for immediate consumption or sale.
   a. Cycle
   b. Anticipation
   c. Safety
   d. Work-in-process

   ANS: A

4. Inspecting, unpacking and storing are components of
   a. Ordering or setup
   b. Holding
   c. Shortage
   d. Unit costs

   ANS: A

5. The largest component of holding cost is
   a. Taxes
   b. Insurance
   c. Handling
   d. Capital costs

   ANS: D

6. Independent demand
   a. Can be derived/calculate
   b. Related to other SKUs
   c. Are also called raw materials
   d. Need to be forecasted

   ANS: D

7. Which of the following is <u>incorrect</u> regarding inventory management?
   a. The two fundamental inventory decisions are 1) when to order and 2) what to order
   b. Inventory can be intangibles -- for example, best-practice knowledge base
   c. Stochastic demand by its nature cannot be stable and deterministic demand by its nature cannot by dynamic
   d. SKUs are often aggregated or partitioned into groups with similar characteristics or dollar value

   ANS: C

8. Backorders are
   a. Not planned
   b. Generally more expensive than stockouts
   c. Used to smooth demand
   d. Used with perishable assets

   ANS: C

9. Using ABC analysis, continuous monitoring and accurate record keeping relates best to _____ items.
   a. A
   b. B
   c. C
   d. B and C

   ANS: A

10. Which is <u>not</u> correct regarding cycle counting?

a. Errors are detected on a more timely basis and causes can be investigated and corrected.
b. A-items are counted more frequently.
c. Annual physical inventory counts are eliminated.
d. Each employee does their own cycle counting

ANS: D

11. Which of the following is not true regarding radio frequency identification (RFID) chips?
a. Allows scanners to track SKUs as they move throughout a store
b. Will make employee scanning time quicker
c. Can help track inventory on a self to trigger replenishment orders
d. Recalled or expired products can be identified and pulled from the store

ANS: B

12. Inventory position is affected by all the following except
a. On hand
b. Scheduled receipts
c. Backorders
d. Variability

ANS: D

13. Using a fixed inventory system, as the reorder point r increases
a. Safety stock increases
b. Safety stock decreases
c. The number of orders increases
d. The number of orders decreases

ANS: A

14. Which of the following is not a key assumption underlining the classic economic order quantity model?
a. The entire order quantity arrives in the inventory at one time
b. There are only two types of relevant costs: order/setup and inventory-holding
c. Storage/warehouse capacity is a bottleneck/constraint
d. Allows no stockouts

ANS: C

15. The EOQ model
a. Is very sensitive
b. Is relatively flat (shallow) around the minimum
c. Balances holding costs and stockout costs
d. Allows for variable demand

ANS: B

16. Which of the following is least related to the others?
a. Service level
b. Probability of stockout
c. Safety stock
d. Optimal solution

ANS: D

17. Lead-time is currently one week. The average demand during the week is 100 units with a standard deviation of 20 units. If the supplier increases lead-time to 4 weeks, what will be the standard deviation of lead-time demand?
    a. 40
    b. 80
    c. 17.89
    d. 44.72

    ANS: A

18. Which is not an advantage of the periodic review system?
    a. Helps to control "A" items
    b. Inventory need not be monitored continually
    c. Useful when a large number of items is ordered from the same supplier
    d. Consolidated shipments lower freight costs

    ANS: A

19. Which of the following is not true regarding the EOQ model with back orders?
    a. (Q-S) Units will be placed in inventory
    b. Backorders increase the total cost for the customer because of a higher sales cost
    c. Part of backorder costs can be expresses as loss of good will
    d. Used when holding cost is high

    ANS: B

20. Using the quantity discount model, if a firm orders a larger quantity than the EOQ, which annual cost usually goes down?
    a. Purchase and holding
    b. Holding and ordering
    c. Purchase and ordering
    d. Safety and holding

    ANS: C

21. In one lead-time, the probability of a stockout is the probability that
    a. Demand will be greater than the reorder level
    b. Demand will be less than the reorder level
    c. Supply will be greater than the reorder level
    d. Supply will be less than the reorder level

    ANS: A

22. Average inventory is defined as
    a. The order quantity divided by the number of inventory cycles per year
    b. Annual usage divided by the number of inventory cycles per year
    c. One-half the order quantity plus safety stock
    d. One-half the annual usage

    ANS: C

23. _____ is the result of dividing the annual demand by the quantity ordered (Q) each time.
    a. Annual number of orders placed
    b. Average inventory
    c. Maximum inventory
    d. Days of lead-time

    ANS: A

29) Which of the following is a function of inventory?
A) to decouple or separate parts of the production process
B) to decouple the firm from fluctuations in demand and provide a stock of goods that will provide a selection for customers
C) to take advantage of quantity discounts
D) to hedge against inflation
E) All of the above are functions of inventory.
Answer: E
Diff: 2
Topic: Functions of inventory
Objective: no LO

30) Which of the following would not generally be a motive for a firm to hold inventories?
A) to decouple or separate parts of the production process
B) to provide a stock of goods that will provide a selection for customers
C) to take advantage of quantity discounts
D) to minimize holding costs
E) All of the above are functions of inventory.
Answer: D
Diff: 2
Topic: Functions of inventory
Objective: no LO

31) Which of the following is not one of the four main types of inventory?
A) raw material inventory
B) work-in-process inventory
C) maintenance/repair/operating supply inventory
D) safety stock inventory
E) All of these are main types of inventory.
Answer: D
Diff: 2
Topic: Functions of inventory
Objective: no LO

32) Which of the following statements about ABC analysis is **false**?
A) ABC analysis is based on the presumption that controlling the few most important items produces the vast majority of inventory savings.
B) In ABC analysis, "A" Items are tightly controlled, have accurate records, and receive regular review by major decision makers.
C) In ABC analysis, "C" Items have minimal records, periodic review, and simple controls.
D) ABC analysis is based on the presumption that all items must be tightly controlled to produce important cost savings.
E) All of the above statements are true.
Answer: D
Diff: 2
Topic: Managing inventory
Objective: LO12-1

33) All of the following statements about ABC analysis are true **except**
A) inventory may be categorized by measures other than dollar volume
B) it categorizes on-hand inventory into three groups based on annual dollar volume
C) it is an application of the Pareto principle
D) it states that all items require the same degree of control
E) it states that there are the critical few and the trivial many inventory items
Answer: D
Diff: 2
Topic: Managing inventory
Objective: LO12-1

34) ABC analysis is based upon the principle that
A) all items in inventory must be monitored very closely
B) there are usually a few critical items, and many items which are less critical
C) an item is critical if its usage is high
D) more time should be spent on class "C" items because there are more of them
E) an item is critical if its unit price is high
Answer: B
Diff: 2
Topic: Managing inventory
Objective: LO12-1

35) ABC analysis divides on-hand inventory into three classes, generally based upon
A) item quality
B) unit price
C) the number of units on hand
D) annual demand
E) annual dollar volume
Answer: E
Diff: 2
Topic: Managing inventory
Objective: LO12-1

36) Cycle counting
A) is a process by which inventory records are verified once a year
B) provides a measure of inventory accuracy
C) provides a measure of inventory turnover
D) assumes that all inventory records must be verified with the same frequency
E) assumes that the most frequently used items must be counted more frequently
Answer: B
Diff: 2
Topic: Managing inventory
Objective: LO12-2

37) Which of the following statements regarding control of service inventories is **true**?
A) Service inventory is a fictional concept, because services are intangible.
B) Service inventory needs no safety stock, because there's no such thing as a service stockout.
C) Effective control of all goods leaving the facility is one applicable technique.
D) Service inventory has carrying costs but not setup costs.
E) All of the above are true.
Answer: C
Diff: 2
Topic: Managing inventory
Objective: no LO

38) The two most basic inventory questions answered by the typical inventory model are
A) timing and cost of orders
B) quantity and cost of orders
C) timing and quantity of orders
D) order quantity and service level
E) ordering cost and carrying cost
Answer: C
Diff: 2
Topic: Inventory models for independent demand
Objective: no LO

39) Among the advantages of cycle counting is that it
A) makes the annual physical inventory more acceptable to management
B) does not require the detailed records necessary when annual physical inventory is used
C) does not require highly trained people
D) allows more rapid identification of errors and consequent remedial action than is possible with annual physical inventory
E) does not need to be performed for less expensive items
Answer: D
Diff: 2
Topic: Managing inventory
Objective: LO12-2

40) Which of the following are elements of inventory holding costs?
A) housing costs
B) material handling costs
C) investment costs
D) pilferage, scrap, and obsolescence
E) All of the above are elements of inventory holding cost.
Answer: E
Diff: 2
Topic: Inventory models
Objective: LO12-3

41) Which of the following is not an assumption of the economic order quantity model shown below?

$$Q^* = \sqrt{\frac{2 \cdot D \cdot S}{H}}$$

A) Demand is known, constant, and independent.
B) Lead time is known and constant.
C) Quantity discounts are not possible.
D) Production and use can occur simultaneously.
E) The only variable costs are setup cost and holding (or carrying) cost.
Answer: D
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-3

42) The primary purpose of the basic economic order quantity model shown below is

$$Q^* = \sqrt{\frac{2 \cdot D \cdot S}{H}}$$

A) to calculate the reorder point, so that replenishments take place at the proper time
B) to minimize the sum of carrying cost and holding cost
C) to maximize the customer service level
D) to minimize the sum of setup cost and holding cost
E) to calculate the optimum safety stock
Answer: D
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-3

43) If the actual order quantity is the economic order quantity in a problem that meets the assumptions of the economic order quantity model shown below, the average amount of inventory on hand

$$Q^* = \sqrt{\frac{2 \cdot D \cdot S}{H}}$$

A) is smaller than the holding cost per unit
B) is zero
C) is one-half of the economic order quantity
D) is affected by the amount of product cost
E) All of the above are true.
Answer: C
Diff: 3
Topic: Inventory models for independent demand
Objective: LO12-3

44) A certain type of computer costs $1,000, and the annual holding cost is 25%. Annual demand is 10,000 units, and the order cost is $150 per order. What is the approximate economic order quantity?
A) 16
B) 70
C) 110
D) 183
E) 600
Answer: C
Diff: 2
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

45) Most inventory models attempt to minimize
A) the likelihood of a stockout
B) the number of items ordered
C) total inventory based costs
D) the number of orders placed
E) the safety stock
Answer: C
Diff: 1
Topic: Inventory models for independent demand
Objective: LO12-3

46) In the basic EOQ model, if the cost of placing an order doubles, and all other values remain constant, the EOQ will
A) increase by about 41%
B) increase by 100%
C) increase by 200%
D) increase, but more data is needed to say by how much
E) either increase or decrease
Answer: A
Diff: 2
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

47) In the basic EOQ model, if D=6000 per year, S=$100, H=$5 per unit per month, the economic order quantity is approximately
A) 24
B) 100
C) 141
D) 490
E) 600
Answer: C
Diff: 2
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

48) Which of the following statements about the basic EOQ model is true?
A) If the ordering cost were to double, the EOQ would rise.
B) If annual demand were to double, the EOQ would increase.
C) If the carrying cost were to increase, the EOQ would fall.
D) If annual demand were to double, the number of orders per year would increase.
E) All of the above statements are true.
Answer: E
Diff: 3
Topic: Inventory models for independent demand
Objective: LO12-3

49) Which of the following statements about the basic EOQ model is **false**?
A) If the setup cost were to decrease, the EOQ would fall.
B) If annual demand were to increase, the EOQ would increase.
C) If the ordering cost were to increase, the EOQ would rise.
D) If annual demand were to double, the EOQ would also double.
E) All of the above statements are true.
Answer: D
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-3

50) A product whose EOQ is 40 experiences a decrease in ordering cost from $90 per order to $10. The revised EOQ is
A) three times as large
B) one-third as large
C) nine times as large
D) one-ninth as large
E) cannot be determined
Answer: B
Diff: 3
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

51) A product whose EOQ is 400 experiences a 50% increase in demand. The new EOQ is
A) unchanged
B) increased by less than 50%
C) increased by 50%
D) increased by more than 50%
E) cannot be determined
Answer: B
Diff: 3
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

52) For a certain item, the cost-minimizing order quantity obtained with the basic EOQ model was 200 units and the total annual inventory (carrying and setup) cost was $600. The inventory carrying cost per unit per year for this item is
A) $1.50
B) $2.00
C) $3.00
D) $150.00
E) not enough data to determine
Answer: C
Diff: 3
Topic: Inventory models for independent demand
AACSB: Analytic Skills

Objective: LO12-3

53) A product has demand of 4000 units per year. Ordering cost is $20 and holding cost is $4 per unit per year. The EOQ model is appropriate. The cost-minimizing solution for this product will cost _____ per year in total annual inventory costs.
A) $400
B) $800
C) $1200
D) Zero; this is a class C item.
E) Cannot be determined because unit price is not known.
Answer: B
Diff: 2
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

54) A product has demand of 4000 units per year. Ordering cost is $20 and holding cost is $4 per unit per year. The cost-minimizing solution for this product is to order
A) all 4000 units at one time
B) 200 units per order
C) every 20 days
D) 10 times per year
E) none of the above
Answer: B
Diff: 2
Topic: Inventory models for independent demand
AACSB: Analytic Skills
Objective: LO12-3

55) Which of the following statements regarding the reorder point is true?
A) The reorder point is that quantity that triggers an action to restock an item.
B) There is a reorder point even if lead time and demand during lead time are constant.
C) The reorder point is larger than d x L if safety stock is present.
D) The fixed-period model has no reorder point.
E) All of the above are true.
Answer: E
Diff: 2
Topic: Inventory models for independent demand, and Probabilistic models and safety stock
Objective: LO12-4

56) The EOQ model with quantity discounts attempts to determine
A) what is the lowest amount of inventory necessary to satisfy a certain service level
B) what is the lowest purchasing price
C) whether to use fixed-quantity or fixed-period order policy
D) how many units should be ordered
E) what is the shortest lead time
Answer: D
Diff: 2

Topic: Inventory models for independent demand
Objective: LO12-6

57) An inventory decision rule states "when the inventory level goes down to 14 gearboxes, 100 gearboxes will be ordered." Which of the following statements is true?
A) One hundred is the reorder point, and 14 is the order quantity.
B) Fourteen is the reorder point, and 100 is the order quantity.
C) The number 100 is a function of demand during lead time.
D) Fourteen is the safety stock, and 100 is the reorder point.
E) None of the above is true.
Answer: B
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-4

62) Which category of inventory holding costs is much higher than average for rapid-change industries such as PCs and cell phones?
A) housing costs
B) material handling costs
C) labor cost
D) parts cost
E) pilferage, scrap, and obsolescence
Answer: E
Diff: 2
Topic: Inventory models
Objective: no LO

63) When quantity discounts are allowed, the cost-minimizing order quantity
A) is always an EOQ quantity
B) minimizes the sum of holding and ordering costs
C) minimizes the unit purchase price
D) may be a quantity below that at which one qualifies for that price
E) minimizes the sum of holding, ordering, and product costs
Answer: E
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-6

64) Which of the following statements about quantity discounts is **false**?
A) The cost-minimizing solution may or may not be where annual holding costs equal annual ordering costs.
B) In inventory management, item cost becomes relevant to inventory decisions only when a quantity discount is available.
C) If carrying costs are expressed as a percentage of value, EOQ is larger at each lower price in the discount schedule.
D) The larger annual demand, the less attractive a discount schedule will be.
E) The smaller the ordering cost, the less attractive a discount schedule will be.
Answer: D
Diff: 2
Topic: Inventory models for independent demand
Objective: LO12-6

65) If the standard deviation of demand is six per week, demand is 50 per week, and the desired service level is 95%, approximately what is the statistical safety stock?
A) 8 units
B) 10 units
C) 16 units
D) 64 units
E) Cannot be determined without lead time data.
Answer: E
Diff: 2
Topic: Probabilistic models with constant lead time
Objective: LO12-7

66) A specific product has demand during lead time of 100 units, with a standard deviation of 25 units. What safety stock (approximately) provides a 95% service level?
A) 41
B) 55
C) 133
D) 140
E) 165
Answer: A
Diff: 2
Topic: Probabilistic models with constant lead time
AACSB: Analytic Skills
Objective: LO12-7

67) Demand for dishwasher water pumps is 8 per day. The standard deviation of demand is 3 per day, and the order lead time is four days. The service level is 95%. What should the reorder point be?
A) about 18
B) about 24
C) about 32
D) about 38
E) more than 40
Answer: E
Diff: 2
Topic: Probabilistic models with constant lead time
AACSB: Analytic Skills
Objective: LO12-7

68) The purpose of safety stock is to
A) replace failed units with good ones
B) eliminate the possibility of a stockout
C) eliminate the likelihood of a stockout due to erroneous inventory tally
D) control the likelihood of a stockout due to the variability of demand during lead time
E) protect the firm from a sudden decrease in demand
Answer: D
Diff: 2
Topic: Probabilistic models with constant lead time
Objective: LO12-4, LO12-7

69) The proper quantity of safety stock is typically determined by
A) minimizing an expected stockout cost
B) carrying sufficient safety stock so as to eliminate all stockouts
C) meeting 95% of all demands
D) setting the level of safety stock so that a given stockout risk is not exceeded
E) minimizing total costs
Answer: D
Diff: 2
Topic: Probabilistic models with constant lead time
Objective: LO12-7

70) If demand is not uniform and constant, then stockout risks can be controlled by
A) increasing the EOQ
B) placing an extra order
C) raising the selling price to reduce demand
D) adding safety stock
E) reducing the reorder point
Answer: D
Diff: 2
Topic: Probabilistic models with constant lead time
Objective: LO12-7

71) If daily demand is normally distributed with a mean of 15 and standard deviation of 5, and lead time is constant at 4 days, 90 percent service level will require safety stock of approximately
A) 7 units
B) 10 units
C) 13 units
D) 16 units
E) 26 units
Answer: C
Diff: 2
Topic: Probabilistic models and safety stock
AACSB: Analytic Skills
Objective: LO12-7

72) If daily demand is constant at 10 units per day, and lead time averages 12 days with a standard deviation of 3 days, 95 percent service requires a safety stock of approximately
A) 28 units
B) 30 units
C) 49 units
D) 59 units
E) 114 units
Answer: C
Diff: 2
Topic: Probabilistic models and safety stock
AACSB: Analytic Skills
Objective: LO12-7

73) In a safety stock problem where both demand and lead time are variable, demand averages 150 units per day with a daily standard deviation of 16, and lead time averages 5 days with a standard deviation of 1 day. The standard deviation of demand during lead time is approximately
A) 15 units
B) 100 units
C) 154 units
D) 500 units
E) 13,125 units
Answer: C
Diff: 2
Topic: Probabilistic models and safety stock
AACSB: Analytic Skills
Objective: LO12-7

74) The fixed-period inventory model requires more safety stock than the fixed-quantity models because
A) a stockout can occur during the review period as well as during the lead time
B) this model is used for products that have large standard deviations of demand
C) this model is used for products that require very high service levels
D) replenishment is not instantaneous
E) setup costs and holding costs are large
Answer: A
Diff: 2
Topic: Probabilistic models and safety stock
Objective: LO12-7

75) Which of the following items is mostly likely managed using a single-period order model?
A) Christmas trees
B) canned food at the grocery store
C) automobiles at a dealership
D) metal for a manufacturing process
E) gas sold to a gas station
Answer: A
Diff: 2
Topic: Single-period model
Objective: LO12-7

76) The main trait of a single-period model is that
A) inventory has limited value after a certain period of time
B) it has the largest EOQ sizes
C) demand is unknown
D) supply is limited
E) all of the above
Answer: A
Diff: 2
Topic: Single-period model
Objective: LO12-7

77) A local club is selling Christmas trees and deciding how many to stock for the month of December. If demand is normally distributed with a mean of 100 and standard deviation of 20, trees have no salvage value at the end of the month, trees cost $20, and trees sell for $50 what is the service level?
A) .60
B) .20
C) .84
D) .40
E) unable to determine given the above information
Answer: A
Diff: 2
Topic: Single-period model
AACSB: Analytic Skills
Objective: LO12-7

78) Suppose that a newspaper stand is operating under the following conditions; papers cost $.4, have no salvage value, and sell for $.80. If the salvage value is increased by $.1, what is the increase in service level?
A) .5
B) 0
C) .07
D) 1
E) unable to determine given only the above information
Answer: C
Diff: 2
Topic: Single-period model
AACSB: Analytic Skills
Objective: LO12-7

79) Service level is
A) the chance of stocking out
B) the chance of not stocking out
C) something that should be minimized in retail
D) calculated as the cost of a shortage divided by (the cost of overage + the cost of shortage) for single-period models
E) B and D
Answer: E
Diff: 2
Topic: Single-period model
Objective: LO12-7

80) A bakery wants to determine how many trays of doughnuts it should prepare each day. Demand is normal with a mean of 5 trays and standard deviation of 1 tray. If the owner wants a service level of at least 95% how many trays should he prepare (round to the nearest whole tray)? Assume doughnuts have no salvage value after the day is complete.
A) 5
B) 4
C) 6
D) 7
E) unable to determine with the above information
Answer: D
Diff: 2
Topic: Single-period model
AACSB: Analytic Skills
Objective: LO12-7

CHAPTER 13

1. The words “product family,” “budget allocation” and “long-term” fit best with which level of the generic framework for resource planning?
   a. Aggregate - Level 1
   b. Disaggregation - Level 2
   c. Executing - Level 3
   d. The MRP II Level

   ANS: A

2. If forecast demand exceeds the total factory or supply capacity, managers might simply decide not to meet forecast demand. This decision would most likely be made at
   a. Level 1 - Aggregate
   b. Level 2 - Disaggregate
   c. Level 3 - Execution
   d. The MRP II Level

   ANS: A

3. Assigning people to tasks, setting priorities for jobs and scheduling equipment fits best with which level of the generic framework for resource planning?
   a. Aggregate - Level 1
   b. Disaggregation - Level 2
   c. Executing - Level 3
   d. The Demand Management Level

   ANS: C

4. Which of the following is <u>not</u> an aggregate planning decision option?
   a. Promotion and advertising
   b. Subcontracting
   c. Layoffs
   d. Building a new plant

   ANS: D

5. Which aggregate planning strategy generally would result in the least amount of inventory?
   a. Level
   b. Chase
   c. Mixed
   d. Lot-for-Lot (LFL)

   ANS: B

6. Which of the following is <u>not</u> correct regarding aggregate planning?
   a. Countless alternatives
   b. Good solutions by trial-and-error method
   c. Optimal solutions with linear programming approaches
   d. Too time-consuming if a cross-functional team is used

   ANS: D

7. Which of the following least belongs with the others?
   a. Net demand forecast
   b. Few final products
   c. Individual product requirements
   d. Backlogs called firm orders

   ANS: D

8. A _____ is a statement of how many finished items are to be produced and when they are to be produced.
   a. Aggregate Plan
   b. Master Production Schedule
   c. Material Requirements Planning
   d. Shop Floor Control

   ANS: B

9. Which of the following is not a primary output from a time-phase MRP report?
   a. The capacity report that helps managers develop realistic schedules
   b. Information on obtaining raw materials and purchased parts
   c. Detailed schedules for manufacturing the product and controlling manufacturing inventories
   d. Information that drives cash flow, budgets and financial needs

   ANS: A

10. An inventory item can be
    a. Only a parent
    b. Only a component
    c. Both a parent and a component
    d. Neither a parent or a component

    ANS: C

11. Which of the following is not true regarding component parts commonality?
    a. Leads to higher volumes of parts
    b. Should be at the same level in a bill of materials
    c. Helps reduce engineering design and repair costs
    d. Fixed costs are spread over more units

    ANS: B

12. _____ is/are the total demand for an item derived from all of its parents.
    a. An explosion
    b. Gross requirements
    c. Scheduled receipts
    d. Lot sizing

    ANS: B

13. Time buckets
    a. Are the same as planning horizons

b. Can be set at a day for longer term planning
c. Larger buckets are used as the planning horizon gets longer
d. Cannot be "bucketless"

ANS: C

14. Lot-for-Lot (LFL)
    a. Minimizes purchase or setup costs
    b. Is best used for low inventory carrying costs and high purchase order costs
    c. Is best applied when inventory carrying costs are high and setup/order costs are low
    d. Masks the true nature of dependent demand

    ANS: C

15. Which is <u>not</u> true regarding the Fixed Order Quantity (FOQ) rules used with dependent demand?
    a. May be different for each order
    b. Similar to EOQ and independent demand
    c. May be a pallet load
    d. May not be large enough to cover gross requirements

    ANS: A

16. Which is <u>not</u> true regarding period order quantity (POQ)?
    a. Might be selected judgmentally
    b. Using EOQ, it might be determined an economic time interval
    c. Easy to implement
    d. Longer POQs reduce inventory costs

    ANS: D

17. Manufacturing Resource Planning (MRP II)
    a. Directly schedules vendors
    b. Handles materials but not capacity
    c. Is a major input to aggregate planning
    d. Integrates accounting and financial data

    ANS: D

18. Which is the most comprehensive solution for a firm if a load report shows not enough capacity is available?
    a. Find more capacity
    b. Change the master product schedule
    c. Change both the master production schedule and add capacity
    d. Rerun MRP

    ANS: C

19. All of the following are true regarding safety stock and dependent demand <u>except</u>
    a. Guards against quantity uncertainty
    b. Protects against timing uncertainty
    c. Distorts the true dependent demands between parent and component items
    d. Cannot be used with MRP

ANS: D

20. Which of the following is least likely to be found in service organizations?
    a. Level 2 aggregate planning
    b. Bills of labor
    c. Bills of resources
    d. Dependent demand

    ANS: A

21. The purpose of aggregate planning is to
    a. Minimize the work force size
    b. Maximize the production rate
    c. Minimize the cost of meeting demand
    d. Optimize the inventory level

    ANS: C

38) Demand for a given item is said to be dependent if
A) it originates from the external customer
B) there is a deep bill of material
C) the finished products are mostly services (rather than goods)
D) there is a clearly identifiable parent
E) the item has several children
Answer: D
Diff: 1
Topic: Dependent demand
Objective: no LO

39) The phrase "demand related to the demand for other products" describes
A) a dependent variable
B) dependent demand
C) recursive demand
D) regression analysis
E) independent demand
Answer: B
Diff: 1
Topic: Dependent demand
Objective: no LO

40) Dependent demand and independent demand items differ in that
A) for any product, all components are dependent-demand items
B) the need for independent-demand items is forecast
C) the need for dependent-demand items is calculated
D) All of the above are true.
E) None of the above is true.
Answer: D
Diff: 2
Topic: Dependent demand

Objective: no LO

41) Which of the following is not a key benefit of MRP?
A) quality increases
B) better response times to customer orders
C) faster response to market changes
D) improved utilization of facilities
E) reduced inventory levels
Answer: A
Diff: 2
Topic: Dependent demand
Objective: no LO

42) Effective use of MRP and other dependent demand models does not require which of the following?
A) master production schedule
B) bill of materials
C) inventory availability
D) lead times
E) cost of individual components
Answer: E
Diff: 2
Topic: Dependent inventory model requirements
Objective: no LO

43) A master production schedule specifies
A) the raw materials required to complete the product
B) what component is to be made, and when
C) what product is to be made, and when
D) the labor hours required for production
E) the financial resources required for production
Answer: C
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

44) The _____ is (are) the MRP input detailing which end items are to be produced, when they are needed, and in what quantities.
A) master production schedule
B) gross requirements
C) inventory records
D) assembly time chart
E) bill of material
Answer: A
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

45) A master production schedule contains information about
A) quantities and required delivery dates of all subassemblies
B) quantities and required delivery dates of final products
C) inventory on hand for each subassembly
D) inventory on hand for each final product
E) scheduled receipts for each final product
Answer: B
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

46) The aggregate plan gets input or feedback from which of the following areas?
A) engineering
B) finance, marketing, and human resources
C) the master production schedule
D) procurement, production, and general management
E) all of the above
Answer: E
Diff: 1
Topic: Dependent inventory model requirements
Objective: no LO

47) Which portion of the master production schedule is normally fixed, frozen, or firm?
A) the entire schedule
B) only the aggregate schedule
C) only the middle of the schedule
D) only the near-term portion
E) only the far-term portion
Answer: D
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

48) In continuous (make-to-stock) operations, the master production schedule is usually expressed in terms of
A) end items
B) modules
C) kits
D) customer orders
E) warehouse orders
Answer: A
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

49) In job shop (make-to-order) operations, the master production schedule is usually expressed in
A) end items
B) modules
C) kits
D) customer orders
E) warehouse orders
Answer: D
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

50) The following table is an example of a(n)

	Week 1	Week 2	Week 3	Week 4	Week 5
Clothes Washer		200		100	
Clothes Dryer	300	100	100		100
Upright Freezer			200	500	

A) aggregate plan
B) load report
C) master production schedule
D) capacity plan
E) inventory record
Answer: C
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

51) A document calls for the production of 50 small garden tractors in week 1; 50 small garden tractors and 100 riding mowers in week 2; 100 riding mowers and 200 garden utility carts in week 3; and 100 riding mowers in week 4. This document is most likely a(n)
A) net requirements document
B) resource requirements profile
C) aggregate plan
D) master production schedule
E) Wagner-Whitin finite capacity document
Answer: D
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-2

52) The _____ is the input to material requirements planning which lists the assemblies, subassemblies, parts, and raw materials needed to produce one unit of finished product.
A) bill of material
B) master production schedule
C) inventory records
D) assembly time chart
E) net requirements chart
Answer: A
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

53) A bill of material lists the
A) times needed to perform all phases of production
B) production schedules for all products
C) components, ingredients, and materials required to produce an item
D) operations required to produce an item
E) components, ingredients, materials, and assembly operations required to produce an item
Answer: C
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

54) An engineering change notice is used to change a
A) MRP
B) MPS
C) ERP
D) BOM
E) none of the above
Answer: D
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

55) Firms making many different final products use _____ to facilitate production scheduling.
A) planning bills
B) modular bills
C) phantom bills
D) overdue bills
E) none of the above
Answer: B
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

56) A bill of material must be updated with the corrected dimensions of a part. The document that details this change is a(n)
A) modular bill
B) engineering change notice
C) resource requirements profile
D) lead time-offset product structure document
E) planning bill
Answer: B
Diff: 1
Topic: Dependent inventory model requirements
Objective: LO14-1

57) The bill of material contains information necessary to
A) place an order to replenish the item
B) calculate quantities on hand and on order
C) convert net requirements into higher level gross requirements
D) convert gross requirements into net requirements
E) convert (explode) net requirements at one level into gross requirements at the next level
Answer: E
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

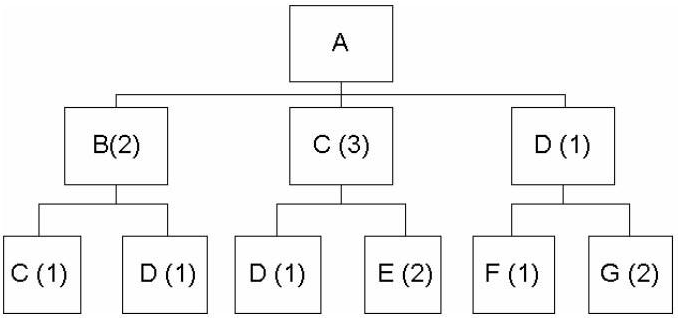
58) Which of the following statements best compares modular bills and phantom bills?
A) Both pertain to assemblies that are not inventoried.
B) There is no difference between the two.
C) Both pertain to assemblies that are inventoried.
D) Modular bills are used for assemblies that are not inventoried, unlike phantom bills.
E) Modular bills represent subassemblies that actually exist and are inventoried, while phantom bills represent subassemblies that exist only temporarily and are not inventoried.
Answer: E
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

59) A paint company mixes ten different base colors into 3,000 different color options. If the MPS is organized around the ten different base colors their bills of material are classified as
A) Phantom
B) Planning
C) Modular
D) Low-Level
E) A and B
Answer: C
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

60) A grill assembly takes 20 washers. Instead of listing these washers separately they are grouped into a single kit for production. The bill of material for the washers is classified as
A) "Pseudo"
B) Planning
C) Modular
D) Low-level
E) A and B

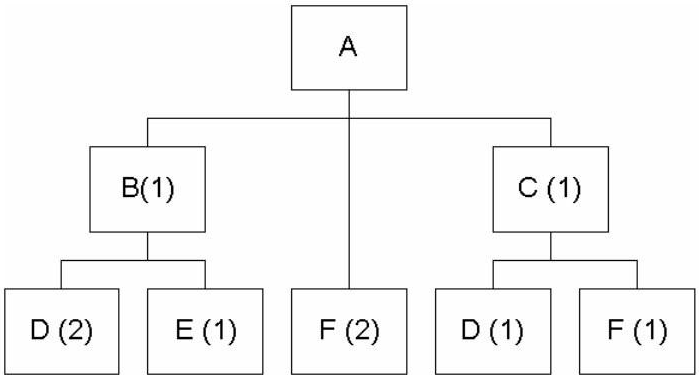
Answer: E
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

62) Given the following bill of material



If the demand for product A is 50 units, what will be the gross requirement for component E?
A) 4
B) 100
C) 200
D) 250
E) 300
Answer: E
Diff: 2
Topic: Dependent inventory model requirements
AACSB: Analytic Skills
Objective: LO14-1

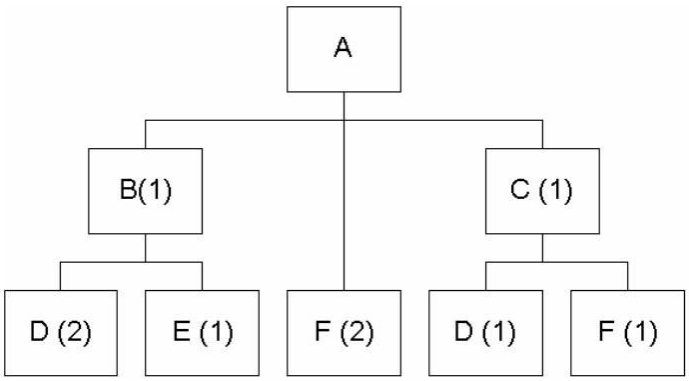
63) Given the following bill of material



If the demand for product A is 50 units, what will be the gross requirement for component E?
A) 50
B) 100
C) 150
D) 200
E) 300
Answer: A
Diff: 2
Topic: Dependent inventory model requirements
AACSB: Analytic Skills
Objective: LO14-1

64) When safety stock is deemed absolutely necessary, the usual policy is to build it into which category of the MRP logic?
A) Gross Requirements
B) Scheduled Receipts
C) Projected On Hand
D) Net Requirements
E) Planned Order Receipts
Answer: C
Diff: 2
Topic: MRP structure
Objective: LO14-2

65) Given the following bill of material



If the demand for product A is 30 units, and there are 10 units of B on hand and none of C, how many units of part D will be needed?
A) 3
B) 40
C) 70
D) 90
E) 110
Answer: C
Diff: 3
Topic: Dependent inventory model requirements
AACSB: Analytic Skills
Objective: LO14-1

66) Low level coding means that
A) a final item has only a few levels in the BOM structure
B) it is the code for the lowest level in the BOM structure
C) a component item is coded at the lowest level at which it appears in the BOM structure
D) the top level of the BOM is below level zero and that BOMs are not organized around the finished product
E) none of the above
Answer: C
Diff: 2
Topic: Dependent inventory model requirements
Objective: LO14-1

67) It is week 1 and there are currently 20 As in stock. The MPS calls for 300 As at the start of week 5. If there are scheduled receipts planned for week 3 and week 4 of 120 As each and A has a lead time of 1 week when and how large of an order should be placed to meet the requirement of 300 As?
A) Week 1, 300 A s
B) Week 1, 40 A s
C) Week 5, 40 A s
D) Week 4, 40 A s
E) Week 4, 300 A s
Answer: D
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-3

68) If safety stock is desired it should be built into which portion of MRP?
A) any
B) none
C) raw materials
D) finished assemblies
E) either C or D
Answer: E
Diff: 2
Topic: MRP structure
Objective: LO14-3

69) Each X requires 2 of component Y; each Y requires 4 of part Z. The lead time for assembly of X is 1 week. The lead time for the manufacture of Y is 1 week. The lead time for the procurement of Z is 6 weeks. The cumulative lead time for X is _____ weeks.
A) 6
B) 7
C) 8
D) 10
E) cannot be determined
Answer: C
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-2

70) A material requirements plan contains information with regard to all of the following except
A) quantities and required delivery dates of all subassemblies
B) quantities and required delivery dates of final products
C) the capacity needed to provide the projected output rate
D) inventory on hand for each final product
E) inventory on hand for each subassembly
Answer: C
Diff: 2
Topic: MRP structure
Objective: LO14-3

71) Each R requires 2 of component S and 1 of part T. The lead time for assembly of R is 3 days. The lead time for the manufacture of S is 5 days. The lead time for the manufacture of T is 10 days. The cumulative lead time for R is _____ days.
A) 6
B) 9
C) 13
D) 17
E) cannot be determined
Answer: C
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-2

72) Each R requires 4 of component S; each S requires 3 of part T. The lead time for assembly of R is 1 week. The lead time for the manufacture of S is 2 weeks. The lead time for the procurement of T is 6 weeks. The cumulative lead time for R is _____ weeks.
A) 6
B) 9
C) 12
D) 18
E) 28
Answer: B
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-2

73) Which of the following best describes a gross material requirements plan?
A) a schedule that shows total demand for an item, and when it must be ordered from a supplier or when production must be started
B) an intermediate range plan for the scheduling of families of products
C) a chart illustrating whether capacity has been exceeded
D) a table that corrects scheduled quantities for inventory on hand
E) a schedule showing which products are to be manufactured and in what quantities
Answer: A
Diff: 2
Topic: MRP structure
Objective: LO14-2

74) Which of the following statements regarding the gross material requirements plan is true?
A) It shows total demand for an item.
B) It shows when an item must be ordered from a supplier or when production must be started.
C) It combines a master production schedule with the time-phased schedule.
D) It requires several inputs, including an accurate bill of material.
E) All of the above are true.
Answer: E
Diff: 2
Topic: MRP structure
Objective: LO14-2

75) The MPS calls for 110 units of Product M. There are currently 30 of Product M on hand. Each M requires 4 of Component N. There are 20 units of N on hand. The net requirements for N are
A) 150
B) 170
C) 300
D) 320
E) 440
Answer: C
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-3

76) The MPS calls for 50 units of Product A and 60 of B. There are currently 25 of Product B on hand. Each A requires 2 of Part C; each B requires 5 of C. There are 160 units of C available. The net requirements for C are
A) 115
B) 175
C) 240
D) 690
E) 700
Answer: A
Diff: 3
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-3

77) The MPS calls for 110 units of Product A. There are currently 60 of Product A on hand. Each A requires 4 of Part B. There are 20 units of B available. The net requirements for B are
A) 20
B) 120
C) 180
D) 240
E) 440
Answer: C
Diff: 2
Topic: MRP structure
AACSB: Analytic Skills
Objective: LO14-3

78) In MRP record calculations, the appearance of a negative value for the gross requirements of an end item in a specific time bucket
A) signals the need to purchase that end item in that period
B) implies that value was scheduled by the MPS
C) signals the need for a negative planned order receipt in that period
D) is impossible
E) All of the above are true.
Answer: D
Diff: 2
Topic: MRP structure
Objective: LO14-3

79) The number of units projected to be available at the end of each time period refers to
A) net requirements
B) scheduled receipts
C) the projected usage of the item
D) the amount projected to be on hand
E) the amount necessary to cover a shortage
Answer: D
Diff: 2
Topic: MRP structure
Objective: LO14-3

80) Linking a part requirement with the parent component that caused the requirement is referred to as
A) net requirements planning
B) a time fence
C) pegging
D) kanban
E) leveling
Answer: C
Diff: 2
Topic: MRP management
Objective: LO14-3

81) In MRP, system nervousness is caused by
A) management's attempt to continually respond to minor changes in production requirements
B) the use of the lot-for-lot approach
C) management's marking part of the master production schedule as "not to be rescheduled"
D) the use of phantom bills of material
E) management's attempt to evaluate alternative plans before making a decision
Answer: A
Diff: 2
Topic: MRP management
Objective: LO14-3

82) One of the tools that is particularly useful in reducing the system nervousness in the MRP system is (are)
A) modular bills
B) time phasing
C) time fences
D) lot sizing
E) closed loop system
Answer: C
Diff: 2
Topic: MRP management
Objective: LO14-3

83) Which of the following is a step towards integrating JIT and MRP according to the text?
A) smaller buckets
B) increase quality
C) scrap MRP, it does not work with JIT
D) migrate from MRP to ERP
E) All of the above are acceptable steps
Answer: A
Diff: 2
Topic: MRP management
Objective: no LO

84) Distortion in MRP systems can be minimized when safety stock is held at the
A) purchased component or raw material level
B) work-in-process level
C) finished goods level
D) A and B
E) A and C
Answer: E
Diff: 3
Topic: MRP structure
Objective: no LO

85) Material requirements plans specify
A) the quantities of the product families that need to be produced
B) the quantity and timing of planned order releases
C) the capacity needed to provide the projected output rate
D) the costs associated with alternative plans
E) whether one should use phantom bills of material or not
Answer: B
Diff: 2
Topic: MRP structure
Objective: LO14-2

86) Which of the following best differentiates material requirements planning (MRP) from finite capacity scheduling (FCS)?
A) FCS recognizes the finite nature of capacity while MRP does not.
B) FCS works in services while MRP does not.
C) MRP requires time buckets while FCS does not.
D) FCS is an input into traditional MRP systems.
E) FCS uses the Wagner-Whitin algorithm while MRP uses lot-for-lot and EOQ.
Answer: A
Diff: 2
Topic: MRP management
Objective: no LO

87) Which of the following lot-sizing techniques results in the lowest holding costs?
A) lot-for-lot
B) EOQ
C) part-period balancing
D) Wagner-Whitin algorithm
E) the quantity discount model
Answer: A
Diff: 2
Topic: Lot-sizing techniques
Objective: LO14-4

88) Which of the following statements is **true** about the MRP plan when using lot-for-lot ordering?
A) The quantity of gross requirements for a child item is always equal to the quantity of planned order releases for its parent.
B) The quantity of gross requirements for a child item is equal to the quantity of planned order release(s) multiplied by the number of child items used in the parent assembly.
C) The quantity of gross requirements for a child item is always equal to the quantity of gross requirements for its parent.
D) The quantity and gross requirements for a child item is always equal to the quantity of net requirements for its parent.
E) All of the above are true.
Answer: B
Diff: 2
Topic: MRP structure
Objective: LO14-3

89) What lot-sizing technique is generally preferred when inventory holding costs are extremely high?
A) lot-for-lot
B) EOQ
C) part-period balancing
D) the Wagner-Whitin algorithm
E) All of the above are appropriate for the situation.
Answer: A
Diff: 2
Topic: Lot-sizing techniques
Objective: LO14-4

90) For the lot-sizing technique known as lot-for-lot to be appropriate
A) future demand should be known for several weeks
B) setup cost should be relatively small
C) annual volume should be rather low
D) item unit cost should be relatively small
E) the independent demand rate should be very stable
Answer: B
Diff: 2
Topic: Lot-sizing techniques
Objective: LO14-4

91) An item's holding cost is 60 cents per week. Each setup costs $120. Lead time is 2 weeks. EPP is
A) .005
B) 60
C) 72
D) 100
E) 200
Answer: E
Diff: 2
Topic: Lot-sizing techniques
AACSB: Analytic Skills
Objective: LO14-4

92) Which of the following statements regarding lot-sizing is **true**?
A) EOQ principles should be followed whenever economical.
B) Too much concern with lot-sizing results in false accuracy.
C) Lot-for-lot cannot be modified for scrap allowance or process constraints.
D) The Wagner-Whitin algorithm simplifies lot size calculations.
E) All of the above are true.
Answer: B
Diff: 2
Topic: Lot-sizing techniques
Objective: LO14-4

93) A firm makes numerous models of mowers, garden tractors, and gasoline powered utility vehicles. Some assemblies and parts are common to many end items. To relieve the MPS of performing order releases on these common parts, the firm might choose to use the _____ technique.
A) Wagner-Whitin
B) economic part period
C) supermarket
D) gross material requirements
E) resource requirements profile
Answer: C
Diff: 2
Topic: MRP management
Objective: LO14-1

94) Capacity planning in closed-loop MRP
A) utilizes feedback about workload from each work center
B) may make use of resource requirements profiles (load reports)
C) may smooth work center loads with such tactics as overlapping and lot splitting
D) does not add capacity, but rather seeks effective use of existing capacity
E) All of the above are true.
Answer: E
Diff: 2
Topic: Extensions of MRP
Objective: LO14-6

95) If a load report (resource requirements profile) shows a work center scheduled beyond capacity
A) the company must add capacity by enlarging the facility
B) the company must add capacity by such tactics as overtime and subcontracting
C) the work center's load may be smoothed by such tactics as operations splitting or lot splitting
D) the aggregate plan must be revised
E) the Wagner-Whitin algorithm should be used to rebalance the load
Answer: C
Diff: 2
Topic: Extensions of MRP
Objective: LO14-6

96) MRP II is accurately described as
A) MRP software designed for services
B) MRP with a new set of computer programs that execute on microcomputers
C) MRP augmented by other resource variables
D) an enhancement of MRP that plans for all levels of the supply chain
E) a new generation of MRP software that extends MRP to planning and scheduling functions
Answer: C
Diff: 2
Topic: Extensions of MRP
Objective: LO14-5

97) The extension of MRP which extends to resources such as labor hours and machine hours, as well as to order entry, purchasing, and direct interface with customers and suppliers is
A) MRP II
B) enterprise resource planning
C) the master production schedule
D) closed-loop MRP
E) not yet technically possible
Answer: B
Diff: 2
Topic: Extensions of MRP
Objective: LO14-7

98) Which of the following statements regarding MRP in services is **true**?
A) MRP is for manufacturing only, and is not applicable to services.
B) MRP can be used in services, but only those that offer very limited customization.
C) MRP does not work in services because there is no dependent demand.
D) Services such as restaurant meals illustrate dependent demand, and require product structure trees, bills-of-material, and scheduling.
E) None of the above is true.
Answer: D
Diff: 2
Topic: MRP in services
Objective: no LO

CHAPTER 15

1. Which of the following is true regarding the history of quality management?
   a. By using interchangeable parts, workers could control their own processes during the Industrial Revolution.
   b. Six Sigma works at process improvement no matter how it affects profits.
   c. Despite the demise of TQM as a quality "program," its basic principles took root in many organizations and have remained important management practices.
   d. Egyptian wall paintings from around 1450 B.C. show no evidence of measurement and inspection, just forced labor.

   ANS: C

2. All of the following are components of the GAP model except
   a. The discrepancy between delighting or pleasing customers and total customer service and satisfaction
   b. The discrepancy between management's perceptions of what features constitute a target level of quality and the task of translating these perceptions into executable specifications
   c. The discrepancy between quality specifications documented in operating and training manuals and plans and their implementation
   d. The difference between the customer's expectations and perceptions

   ANS: A

3. Which of the following is not considered part of Total Quality?
   a. A focus on the customers and stakeholders

b. A process focus
c. Participation and team work
d. Six Sigma

ANS: D

4. Which of the following is not directly related to W. Edwards Deming?
   a. Message of quality to upper management
   b. DMAIC
   c. Higher quality leads to higher productivity and lower cost
   d. Viewing management processes statistically

   ANS: B

5. Which of the following is not one of W. Edwards Deming's 14 points?
   a. Create a vision and demonstrate commitment
   b. Stop making decisions purely on the basis of cost
   c. Eliminate exhortation
   d. The only performance standard is Zero Defects

   ANS: D

6. Joseph Juran believed
   a. Top management speaks in the language of dollars
   b. Dollars are a universal language for a company
   c. In major cultural change
   d. Conformance to specifications was too narrow a definition of quality

   ANS: A

7. Philip B. Crosby's quality philosophy is embodied in what he calls "The Absolutes of Quality Management" and "The Basic Elements of Improvement." Which of the following does not belong in Crosby's points?
   a. Quality means conformance to requirements not elegance
   b. The only performance standard is Six Sigma
   c. There is no such thing as a quality problem
   d. The only performance measurement is the cost of quality, which is the expense of non-conformance

   ANS: B

8. Deming, Juran and Crosby are more alike than different. All of the following are similarities among them except
   a. Quality is imperative for future competitiveness
   b. Makes top management's commitment is absolute
   c. The seven QC tools
   d. Quality management practices will save

   ANS: C

9. ISO 9000:2000 standards consist of all of the following except
   a. Definition of key terms
   b. Minimum requirements for a quality management system

c. Process simulation
d. A means of demonstrating compliance principles to customers and third-party certification

ANS: C

10. _____ is the collection of people, equipment, facilities, methods and procedures used to assure correctness or adequacy of measurements.
    a. Metrology
    b. Repeatability
    c. Reproducibility
    d. Auditing

    ANS: A

11. All of the following relate to Six Sigma except
    a. Clear financial returns
    b. Measures defects per unit
    c. Output critical to customers
    d. A stretch goal

    ANS: B

12. Which does not fit with Six Sigma implementation?
    a. Emphasizing dpmo
    b. Focusing on corporate sponsor to support team-activity
    c. Computing quality-cost indexes
    d. Extensive training including master black belts

    ANS: C

13. The recognized benchmark for Six Sigma implementation is General Electric (GE). GE's Six Sigma problem solving approach employs five phases. Which is not one of the phases?
    a. Define (D)
    b. Measure (M)
    c. Analyze (A)
    d. Kaizen (K)

    ANS: D

14. A full-time Six Sigma expert responsible for Six Sigma strategy, training, mentoring, deployment and results is called a _____?
    a. Champion
    b. Master black belt
    c. Black belt
    d. Green belt

    ANS: B

15. In reference to quality cost classifications, training and information systems, equipment design would fall in the _____ category.
    a. Prevention
    b. Appraisal
    c. Internal-failure

d. External-failure

ANS: A

16. Machine down time and down grading costs are examples of which type of quality cost?
    a. Prevention
    b. Appraisal
    c. Internal-failure
    d. External-failure

    ANS: C

17. A tool to help determine how a process works is
    a. Run chart
    b. Cause-and-effect diagram
    c. Scatter diagram
    d. Flow chart

    ANS: D

18. A tool to help set priorities is
    a. Flow-charts
    b. Pareto analysis
    c. Cause-and-effect diagram
    d. Scatter diagram

    ANS: B

19. Cause-and-effect diagrams help most in which phase of GE's DMAIC problem-solving approach?
    a. Define
    b. Measure
    c. Analyze
    d. Control

    ANS: C

20. In the Deming cycle, determining whether a trial plan is working correctly by evaluating results, recording the learning and determining if any further issues or opportunities need to be addressed is called _____?
    a. Plan
    b. Do
    c. Study
    d. Act

    ANS: C

21. _____ focuses on small, gradual and frequent improvements over the long-term with minimum financial investment and with participation by everyone in the organization.
    a. Six Sigma
    b. Process re-engineering
    c. Poke-Yoke
    d. Kaizen

ANS: D

22. At a gas station, a diesel pump nozzle that will not fit into a non-diesel automobile is an example of _____?
    a. Kaizen blitz
    b. Process simulation
    c. Poke-Yoke
    d. Reproducibility

    ANS: C

23. Which of the following is not true regarding process simulation?
    a. Are very disruptive
    b. Used when process is complex
    c. Tries to duplicate real process
    d. Repeatedly samples from probability distribution of the input variables to create a distribution of potential outputs

    ANS: A

CHAPTER 16

1. Which of the following is not a component of a control system?
    a. Statistical sampling
    b. Measures of actual performance
    c. Goals or standards
    d. Comparison of actual performance with standards or goals for corrective action if necessary

    ANS: A

2. Quality at the sources means
    a. People responsible for their work
    b. Quality control
    c. Everyone
    d. Top management

    ANS: A

3. Producer risk is
    a. The same as acceptance sampling
    b. The probability of accepting a lot of poor quality
    c. The probability of rejecting a lot of good quality
    d. An actionable tool

    ANS: C

4. In-process control includes all of the following except
    a. Prevent defects

b. Focus on customer requirements
c. Should be done after relatively high-cost operations
d. Before processing operations that may make detection of defectives difficult or costly

ANS: C

5. The relationship between shower water pressure and bathtub/sink drainage at a hotel is
   a. Aimed at internal customers
   b. Actionable
   c. An example of quality at the source
   d. Related to back-office operations

   ANS: B

6. Which of the following is most closely related to Statistical Process Control (SPC)?
   a. Acceptance sampling
   b. Process specifications
   c. Unwanted causes of variation
   d. Self-audits

   ANS: C

7. Common cause variation is
   a. Controllable at the sources
   b. Called assignable cause
   c. Cannot be reduced
   d. The responsibility of management

   ANS: D

8. Regarding special cause variability all are true except
   a. Hard to detect using statistical methods
   b. Arises from external sources that are not inherent in the process
   c. Appear sporadically
   d. Disrupt the random patterns of common cause

   ANS: A

9. If no special causes affect the output of a process, we say that the process is _____; when special causes are present, the process is said to be _____.
   a. Out of control; in control
   b. In control; out of control
   c. Variable; discrete
   d. Assignable; common cause

   ANS: B

10. Which is not related to a discrete metric?
    a. Counting
    b. Visual inspection
    c. Good or bad
    d. Time

ANS: D

11. Which of the following is not related to a continuous metric?
    a. Measured as the degree of conformance
    b. Called variable data
    c. p-chart
    d. Time

    ANS: C

12. SERVQUAL measures five dimensions of external customer perceptions of service quality. Which of the following is not a current dimension?
    a. Tangibles
    b. Reliability
    c. Empathy
    d. GAP

    ANS: D

13. Control charts are all of the following except
    a. Can determine the source of a problem
    b. A rum chart
    c. Based on finding values outside of control limits
    d. Looks for non-random patterns

    ANS: A

14. Benefits of control charts are all of the following except
    a. Can be maintained by employees who run machines
    b. Common language for communication
    c. After a process is in statistical control, its performance to specification is predictable
    d. Must be maintained by managers

    ANS: D

15. $\bar{x}$- and r-charts
    a. Use sample sizes of 36 or greater
    b. Use discrete data
    c. Generally use three standard deviations
    d. Are only affected by a random cause affecting the process if any point falls outside control limits, or if any unusual patterns develop

    ANS: C

16. p-charts
    a. Are limits for proportion of non-conforming items
    b. Use variables
    c. Use smaller sample sizes than $\bar{x}$- and r-charts
    d. Can have negative lower limits

    ANS: A

17. When sample sizes vary, the approximate control limits using average sample size calculations
    a. Are more accurate than individual control limits
    b. Give only one set of control limits
    c. Give a different set of control limits for each sample size
    d. Can only be done on a computer because it takes too long to calculate manually

    ANS: B

18. Which alternative answer does not fit with the others?
    a. p-chart
    b. $\bar{x}$-chart
    c. c-chart
    d. u-chart

    ANS: B

19. c- and u-charts
    a. Are the proportion of non-conforming items
    b. Cannot be used in service applications
    c. Use variable data
    d. Monitor the number of non-conformances per unit

    ANS: D

20. A manufacturer of printed circuit boards produces boards of varying sizes with different numbers of components and connections. To monitor the number of conformances per unit, a/an _____ is used.
    a. $\bar{x}$-chart
    b. p-chart
    c. c-chart
    d. u-chart

    ANS: D

21. Which of the following statements is incorrect?
    a. Type I error can be more damaging if an out-of-control process is not recognized and defects are not caught
    b. Type I error occurs when an incorrect conclusion is reached that a special cause is present when in fact one does not exist
    c. Type II error occurs when special causes are present but are not signaled in the control chart because points fall within control limits by chance.
    d. Type I error results in an unnecessary search for a special cause of variations and may be costly in terms of lost production time and testing

    ANS: A

22. Which statement is incorrect?
    a. For a normal distribution, 99.73% of observations will fall within 3 standard deviations of the mean
    b. Process capability has no meaning if the process is not in statistical control
    c. A process cannot be both in control and not capable
    d. Control and capability are two different concepts

ANS: C

23. On control charts, variations of characteristic measurements that are within control limits are assumed to be the result of
    a. Chance
    b. Defective input materials
    c. Assignable causes
    d. Poor machine tolerances

    ANS: A

24. If one was monitoring the number of errors on a typed page, the chart to use is
    a. $\bar{x}$-chart
    b. r-chart
    c. p-chart
    d. c-chart

    ANS: D

25. Which term is most associated with a p-chart?
    a. Measurement
    b. Range
    c. Binary
    d. Small sample size

    ANS: C

28) If a sample of items is taken and the mean of the sample is outside the control limits the process is
A) out of control and the cause should be established
B) in control, but not capable of producing within the established control limits
C) within the established control limits with only natural causes of variation
D) monitored closely to see if the next sample mean will also fall outside the control limits
E) producing high quality products
Answer: A
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

29) The causes of variation in statistical process control are
A) cycles, trends, seasonality, and random variations
B) producer's causes and consumer's causes
C) mean and range
D) natural causes and assignable causes
E) Type I and Type II
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

30) Natural variations
A) affect almost every production process
B) are the many sources of variation that occur when a process is under control
C) when grouped, form a pattern, or distribution
D) are tolerated, within limits, when a process is under control
E) All of the above are true.
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

31) Natural variations
A) are variations that are to be identified and investigated
B) are variations that can be traced to a specific cause
C) are the same as assignable variations
D) lead to occasional false findings that processes are out of control
E) play no role in statistical process control
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

32) Assignable variation
A) is a sign that a process is under control
B) is to be identified and investigated
C) is the same as random variation
D) is variation that cannot be traced to a specific cause
E) leads to a steep OC curve
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

33) Assignable causes
A) are not as important as natural causes
B) are within the limits of a control chart
C) depend on the inspector assigned to the job
D) are also referred to as "chance" causes
E) are causes of variation that can be identified and investigated
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

34) Control charts for variables are based on data that come from
A) acceptance sampling
B) individual items
C) averages of small samples
D) averages of large samples
E) the entire lot
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

35) The purpose of an x-bar chart is to determine whether there has been a
A) gain or loss in uniformity
B) change in the percent defective in a sample
C) change in the central tendency of the process output
D) change in the number of defects in a sample
E) change in the AOQ
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-2

36) The number of defects after a hotel room cleaning (sheets not straight, smears on mirror, missed debris on carpet, etc) should be measured using a(n)
A) x-bar chart
B) R-chart
C) p-chart
D) c-chart
E) either x-bar or R chart
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

37) The number of late insurance claim payouts per 100 should be measured with a
A) x-bar chart
B) R-chart
C) p-chart
D) c-chart
E) either a p or c chart
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

38) The upper and lower limits for diving ring diameters made by John's Swimming are 40 and 39 cm. John took 11 samples with the following average diameters (39, 39.1, 39.2, 39.3, 39.4, 39.5 39.6, 39.7, 39.8, 39.9, 40). Is the process in control?
A) Yes, no diameters exceeded the control limits.
B) No, some diameters exceeded the control limits.
C) No, there is a distinguishable pattern to the samples.
D) No, the range is not in control.
E) There is not enough information to make a decision.
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-3

39) Red Top Cab Company receives multiple complaints per day about driver behavior. Over 9 days the owner recorded the number of calls to be 3, 0, 8, 9, 6, 7, 4, 9, 8. What is the lower control limit for x-bar?
A) 0
B) -1.35
C) -2
D) 1.35
E) none of the above
Answer: A
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-5

40) A process that is assumed to be in control with limits of 89 +/- 2 had sample averages of the following- 87.1, 87, 87.2, 89, 90, 89.5, 88.5, and 88. Is the process in control?
A) Yes
B) No, one or more averages exceeded the limits.
C) Not enough information to tell.
D) No, there is a distinguishable trend.
E) No, two or more consecutive points are very near the lower (or upper) limit.
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-3

41) Which of the following was Unisys Corp.'s failed quality measure in its management of Florida Health Care Services?
A) percentage of claims processed with errors
B) percentage of claims processed within 30 days
C) number of claims processed per month
D) number of claims denied
E) both A and B
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: no LO

42) Ten samples of a process measuring the number of returns per 100 receipts were taken for a local retail store. The number of returns were 10, 9, 11, 7, 3, 12, 8, 4, 6, 11. Find the standard deviation of the sampling distribution. (Hint- Use p-bar formula)
A) There is not enough information
B) .081
C) 8.1
D) .0273
E) .0863
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-5

43) An x-bar control chart was examined and no data points fell outside of the limits. Can this process be considered in control?
A) No, there could be a pattern to the points.
B) No, the R-chart must be checked.
C) No, the number of samples must be known.
D) Yes
E) Both A and B
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

44) Statistical process control charts
A) display the measurements on every item being produced
B) display upper and lower limits for process variables or attributes, and signal when a process is no longer in control
C) indicate to the process operator the average outgoing quality of each lot
D) indicate to the operator the true quality of material leaving the process
E) none of the above
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

45) A sample of parts is measured. The mean of this sample is in the middle of the control limits, but some individual parts measure too low for design specifications and other parts measure too high. Which of the following is true?
A) The process is out of control, and the cause should be established.
B) The process is in control, but not capable of producing within the established control limits.
C) The process is within the established control limits with only natural causes of variation.
D) The process is outside the established control limits with only natural causes of variation.
E) The process is in control, and there is nothing to worry about.
Answer: B
Diff: 3
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

46) The Central Limit Theorem
A) is the theoretical foundation of the c-chart
B) states that the average of assignable variations is zero
C) allows managers to use the normal distribution as the basis for building some control charts
D) states that the average range can be used as a proxy for the standard deviation
E) controls the steepness of an operating characteristic curve
Answer: C
Diff: 3
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-2

47) For an x-bar chart where the standard deviation is known, the Upper Control Limit
A) is 3 . σ below the mean of sample means for a 3σ control chart
B) is 3 . σ above the mean of sample means for a 3σ control chart
C) is 3 . $\sigma/\sqrt{n}$ below the mean of sample means for a 3σ control chart
D) is 3 . $\sigma/\sqrt{n}$ above the mean of sample means for a 3σ control chart
E) Cannot be calculated unless the average range is known.
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

48) Up to three standard deviations above or below the centerline is the amount of variation that statistical process control allows for
A) Type I errors
B) about 95.5% variation
C) natural variation
D) all types of variation
E) assignable variation
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

49) A manager wants to build control limits for a process. The target value for the mean of the process is 10 units, and the standard deviation of the process is 6. If samples of size 9 are to be taken, the UCL and LCL will be
A) -8 and 28
B) 16 and 4
C) 12 and 8
D) 4 and 16
E) 8 and 12
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-3

50) The type of inspection that classifies items as being either good or defective is
A) variable inspection
B) attribute inspection
C) fixed inspection
D) all of the above
E) none of the above
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-7

51) The x-bar chart tells us whether there has been a
A) gain or loss in dispersion
B) change in the percent defective in a sample
C) change in the central tendency of the process output
D) change in the number of defects in a sample
E) none of the above
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

52) The mean and standard deviation for a process for which we have a substantial history are $\mu = 120$ and $\sigma = 2$. For the variable control chart, a sample size of 16 will be used. What is the mean of the sampling distribution?
A) 1/8 (0.125)
B) 0.5
C) 2
D) 40
E) cannot be determined
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: no LO

53) Jars of pickles are sampled and weighed. Sample measures are plotted on control charts. The ideal weight should be precisely 11 oz. Which type of chart(s) would you recommend?
A) p-charts
B) c-charts
C) $\bar{x}$ - and R-charts
D) $\bar{x}$ -, but not R-charts
E) both p- and c-charts
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

54) If $\bar{\bar{x}}$ = 23 ounces, σ = 0.4 ounces, and n = 16, the $\pm 3\sigma$ control limits will be
A) 21.8 to 24.2 ounces
B) 23 ounces
C) 22.70 to 23.30 ounces
D) 22.25 to 23.75 ounces
E) none of the above
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-3

55) The usual purpose of an R-chart is to signal whether there has been a
A) gain or loss in dispersion
B) change in the percent defective in a sample
C) change in the central tendency of the process output
D) change in the number of defects in a sample
E) none of the above
Answer: A
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

56) A manager wishes to build a σ range chart for a process. The sample size is five, the mean of sample means is 16.01, and the average range is 5.3. From Table S6.1, the appropriate value of D_3 is 0, and D_4 is 2.115. The UCL and LCL for this range chart are
A) 33.9 and 11.2
B) 33.9 and 0
C) 11.2 and 0
D) 6.3 and 0
E) 31.91 and 0.11
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
AACSB: Analytic Skills
Objective: LO6-Supplement-3

57) Plots of sample ranges indicate that the most recent value is below the lower control limit. What course of action would you recommend?
A) Since there is no obvious pattern in the measurements, variability is in control.
B) One value outside the control limits is insufficient to warrant any action.
C) Lower than expected dispersion is a desirable condition; there is no reason to investigate.
D) The process is out of control; reject the last units produced.
E) Variation is not in control; investigate what created this condition.
Answer: E
Diff: 3
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-4

58) To set $\bar{x}$ -chart upper and lower control limits, one must know the process central line, which is the
A) average of the sample means
B) total number of defects in the population
C) percent defects in the population
D) size of the population
E) average range
Answer: A
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-3

59) According to the text, the most common choice of limits for control charts is usually
A) ± 1 standard deviation
B) ± 2 standard deviations
C) ± 3 standard deviations
D) ± 3 standard deviations for means and ± 2 standard deviations for ranges
E) none of the above
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-1

60) Which of the following is true of a p-chart?

A) The lower control limit is found by subtracting a fraction from the average number of defects.
B) The lower control limit indicates the minimum acceptable number of defects.
C) The lower control limit may be below zero.
D) The lower control limit may be at zero.
E) The lower control limit is the same as the lot tolerance percent defective.
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

61) The normal application of a p-chart is in
A) process sampling by variables
B) acceptance sampling by variables
C) process sampling by attributes
D) acceptance sampling by attributes
E) none of the above
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

62) The statistical process chart used to control the number of defects per unit of output is the
A) $\bar{x}$-chart
B) R-chart
C) p-chart
D) AOQ chart
E) c-chart
Answer: E
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

63) The c-chart signals whether there has been a
A) gain or loss in uniformity
B) change in the number of defects per unit
C) change in the central tendency of the process output
D) change in the percent defective in a sample
E) change in the AOQ
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

64) The local newspaper receives several complaints per day about typographic errors. Over a seven-day period, the publisher has received calls from readers reporting the following number of errors: 4, 3, 2, 6, 7, 3, and 9. Based on these data alone, what type of control chart(s) should the publisher use?
A) p-chart
B) c-chart
C) $\bar{x}$-chart
D) R-chart
E) $\bar{x}$- and R-charts
Answer: B
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

65) A manufacturer uses statistical process control to control the quality of the firm's products. Samples of 50 of Product A are taken, and a defective/acceptable decision is made on each unit sampled. For Product B, the number of flaws per unit is counted. What type(s) of control charts should be used?
A) p-charts for A and B
B) p-chart for A, c-chart for B
C) c-charts for both A and B
D) p-chart for A, mean and range charts for B
E) c-chart for A, mean and range charts for B
Answer: B
Diff: 3
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

66) A nationwide parcel delivery service keeps track of the number of late deliveries (more than 30 minutes past the time promised to clients) per day. They plan on using a control chart to plot their results. Which type of control chart(s) would you recommend?
A) $\bar{x}$- and R-charts
B) p-charts
C) c-charts
D) $\bar{x}$-, but not R-charts
E) both p- and c-charts
Answer: C
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-5

67) A run test is used
A) to examine variability in acceptance sampling plans
B) in acceptance sampling to establish control
C) to examine points in a control chart to check for natural variability
D) to examine points in a control chart to check for nonrandom variability
E) none of the above
Answer: D
Diff: 2
Topic: Statistical Process Control (SPC)
Objective: LO6-Supplement-4

68) The main difference between C_p and C_{pk} is that
A) only one ensures the process mean is centered within the limits
B) C_p values above 1 indicate a capable process, C_{pk} values above 2 indicate a capable process
C) both are identical
D) C_p values for a given process will always be greater than or equal to C_{pk} values
E) both A and D
Answer: E
Diff: 3
Topic: Process capability
Objective: LO6-Supplement-6

69) A C_p of 1.33 indicates how many sigma limits
A) 1
B) 1.33
C) 2
D) 3
E) 4
Answer: E
Diff: 2
Topic: Process capability
Objective: LO6-Supplement-6

70) Which of the following is true regarding the process capability index C_{pk}?
A) A C_{pk} index value of 1 is ideal, meaning all units meet specifications.
B) The larger the C_{pk}, the more units meet specifications.
C) The C_{pk} index can only be used when the process centerline is also the specification centerline.
D) Positive values of the C_{pk} index are good; negative values are bad.
E) None of the above is true.
Answer: B
Diff: 2
Topic: Process capability
Objective: LO6-Supplement-6

71) If the C_{pk} index exceeds 1
A) the AQL must be smaller than the LTPD
B) σ must be less than one-third of the difference between the specification and the process mean
C) the x-bar chart must indicate that the process is in control
D) the process is capable of Six Sigma quality
E) the process is characterized as "not capable"
Answer: B
Diff: 2
Topic: Process capability
Objective: LO6-Supplement-6

72) The statistical definition of Six Sigma allows for 3.4 defects per million. This is achieved by a C_{pk} index of
A) 0
B) 1
C) 1.33
D) 1.67
E) 2
Answer: E
Diff: 2
Topic: Process capability
Objective: LO6-Supplement-6

73) A C_{pk} index of 1.00 equates to a defect rate of
A) five percent
B) 3.4 defects per million
C) 2.7 per 1,000 items
D) 97.23 percent
E) one percent
Answer: C
Diff: 2
Topic: Process capability
Objective: LO6-Supplement-6

74) Acceptance sampling
A) is the application of statistical techniques to the control of processes
B) was developed by Walter Shewhart of Bell Laboratories
C) is used to determine whether to accept or reject a lot of material based on the evaluation of a sample
D) separates the natural and assignable causes of variation
E) all of the above
Answer: C
Diff: 2
Topic: Acceptance sampling
Objective: LO6-Supplement-7

75) Acceptance sampling's primary purpose is to
A) estimate process quality
B) estimate lot quality
C) detect and eliminate defectives
D) decide if a lot meets predetermined standards
E) determine whether defective items found in sampling should be replaced
Answer: D
Diff: 3
Topic: Acceptance sampling
Objective: LO6-Supplement-7

CHAPTER 17

1. According to the Toyota Motor Company, which of the following is not one of the seven major waste categories?
   a. Overproduction
   b. Transportation
   c. Motion
   d. Single-piece flow

   ANS: D

2. Long lead-times and higher work-in-process is most closely related to which of Toyota's "Seven Major Waste Categories?"
   a. Overproduction
   b. Single-piece flow
   c. Waiting time
   d. Transportation

   ANS: C

3. Methods to increase the speed and response of the value chain include all of the following except
   a. A push operating system
   b. Driven by a common master production schedule
   c. Improved information technology
   d. Partnerships with customers and suppliers

   ANS: A

4. If the value stream is faster than takt time
   a. Customer demand cannot be met
   b. Overproduction is occurring
   c. Overtime is a solution
   d. The size of the transfer batch should be reduced

   ANS: B

5. Smaller batch sizes are facilitated by all the following except
   a. Setup and teardown time reduction
   b. Changes in plant layout
   c. Transfer batches
   d. Economies of scale

ANS: D

6. In the 5Ss system, items identified as unnecessary and thus removed would be included with which S?
   a. Sort
   b. Set in order
   c. Shine
   d. Standardize

   ANS: A

7. All of the following are reasons for standardized containers in JIT except
   a. No reason to unpack and count
   b. Eliminate potential for damage
   c. Designed to fill a full truck or railroad car
   d. Designed to go directly to the assembly line

   ANS: C

8. Storing required tools next to a machine, using conveyors and better labeling and identification best relate to
   a. Quality at the source
   b. Stable Production Schedules (SPS)
   c. Visual controls
   d. Single Minute Exchange of Dies (SMED)

   ANS: D

9. All of the following are similarities between lean manufacturing and 6-Sigma except
   a. Driven by customer requirements
   b. Requires advanced training
   c. Focus on real dollar savings
   d. Each requires senior leadership

   ANS: B

10. Total Production Maintenance (TPM)
    a. Puts total responsibility on maintenance workers
    b. Puts total responsibility on equipment operations
    c. Eliminates all down time
    d. Employees preserve and protect their equipment

    ANS: D

11. _____ a good by returning it to close to its original specifications is a "green manufacturing" option.
    a. Repairing
    b. Refurbishing
    c. Remanufacturing
    d. Recycling

    ANS: C

12. Which of the following is least related to a push system?
    a. Maximum customer responsiveness
    b. Predefined schedule
    c. Finished goods inventory
    d. Based on forecast

    ANS: A

13. Which of the following is least related to a pull system?
    a. Enterprise Resource Planning (ERP)
    b. Final assembly schedule
    c. Real time information
    d. Sales rate

    ANS: A

14. A withdraw Kanban
    a. Authorizes production
    b. Authorizes suppliers to produce
    c. Authorizes the transfer of an empty container
    d. Authorizes shipping to customers

    ANS: C

15. Which of the following least fits with the others?
    a. Kanban card
    b. Empty space
    c. Empty container
    d. Takt time

    ANS: D

16. The number of Kanban cards (K) is dependent on all of the following except
    a. Average daily demand rate
    b. Setup time
    c. Part waiting time
    d. Safety stock

    ANS: B

17. If Kanban cards are removed,
    a. Safety stock must be increased
    b. More workers are needed
    c. Inefficiencies are exposed
    d. Less workers are needed

    ANS: C

18. Which one of the following best describes the objectives of JIT?
    a. Quick setups
    b. Minimum inventory
    c. Continuous improvement
    d. Cross-trained workers

ANS: C