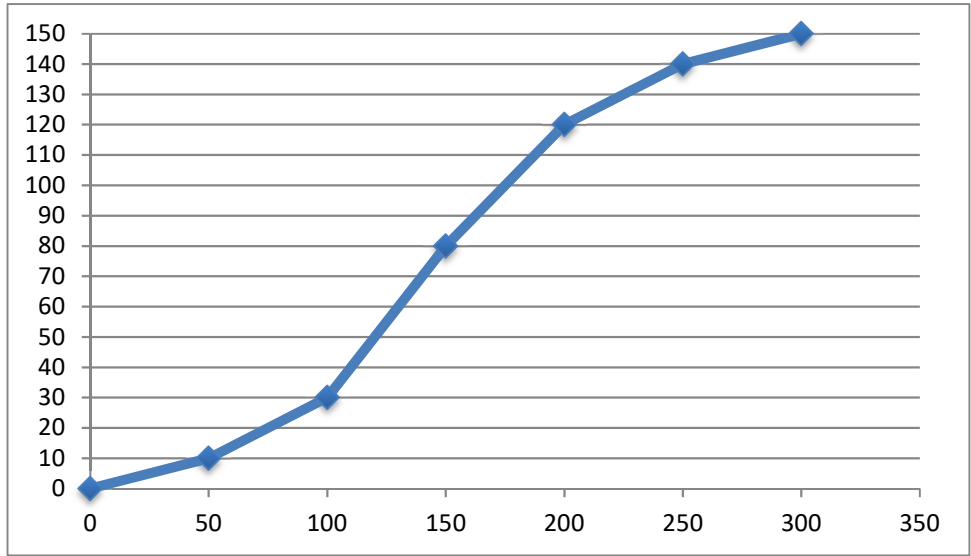


**Statistics 2035 – Practice Set #1 – Questions from Chapters 1 to 8**

1. Of the four levels of data measurement (nominal, ratio ordinal, interval), for which ones can you calculate a meaningful value of the mean?
- (A) Only for ratio                      (B) Only for ordinal, interval, and ratio  
(C) Only for nominal                  (D) Only for interval and ratio

**Use the following ogive for the variable,  $x$ , for the next TWO questions:**  
The vertical axis is frequency, and the horizontal axis are values of the variable  $x$ .



2. If you were to create a relative frequency polygon from this ogive, what would be the point on the vertical axis and what would be the point on the horizontal axis (in that order) that represents the class interval 100 – 150 ?
- (A) (0.33, 125)              (B) (0.33, 150)              (C) (0.53, 125)              (D) (0.53, 150)
3. What is the 80<sup>th</sup> percentile of the distribution of  $x$ ?
- (A) 150                      (B) 200                      (C) 120                      (D) 280
4. The 2017 gross sales for all big firms in a city has a mean of \$5.2 million and a standard deviation of \$0.8 million. According to Chebychev’s Theorem, within what interval would we get at least 89% of the gross sales?
- (A) Between \$2.8 million to \$6.6 million  
(B) Between \$2.8 million to \$7.6 million  
(C) Between \$2.6 million to \$6.8 million  
(D) Between \$2.6 million to \$7.6 million

5. Test scores for high school seniors on a standardized test are normally distributed (bell shaped, symmetrical) with mean  $\mu = 75.84$ , and standard deviation  $\sigma = 4.55$ . Using the empirical rule, what percentage of test scores are above 66.74 and below 80.39?

- (A) 84.00%                      (B) 95.00%                      (C) 81.50%                      (D) 83.85%

6. Assume we have a data set with 12 observations.  $\sum x^2 = 8050$  and  $\bar{x} = 25$ . What is the sample variance for this data set?

- (A) 670.83                      (B) 45.83                      (C) 50.00                      (D) 25.90

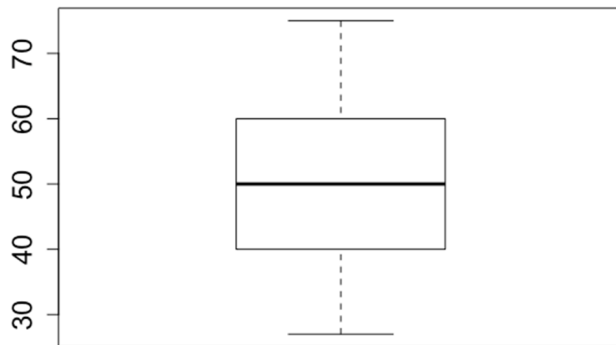
7. Suppose an ordered data set is given as follows:

4, 6, 8, 11, 15, 16, 17, 21, 22, 24,  $x$ , 30, 31, 33.

If the IQR is 15.5, what is the value of  $x$ ?

- (A) 26.5                      (B) 29                      (C) 26                      (D) 25

8. The following boxplot shows income for students who recently graduated. How far above the median would a data value have to be in order to be considered a mild outlier?



- (A) More than 30                      (B) More than 60                      (C) More than 45                      (D) More than 40

9. In a mathematics class, 10 students are randomly selected and the grades for the first 8 students are ordered from lowest to highest.

58, 65, 66, 74, 78, 79, 86, 88

The grade for the 10<sup>th</sup> student is 4 marks higher than the grade for the 9<sup>th</sup> student. If we know that the mean grade for these 10 students is 72, what is the value of the missing grade for the 9<sup>th</sup> student?

- (A) 61                      (B) 63                      (C) 65                      (D) Cannot be determined

**Use the following information for the next TWO questions:**

The following frequency table below shows the daily commute times (minutes) for all 30 employees of a company.

Daily Commute Times	Number of Employees
0 to less than 10	5
10 to less than 20	12
20 to less than 30	6
30 to less than 40	4
40 to less than 50	3

10. What is the value of the median commute time?
- (A) 20.88                      (B) 21.40                      (C) 19.44                      (D) 18.33
11. What is the value of the average commute time?
- (A) 21.00                      (B) 21.28                      (C) 25.00                      (D) 20.88
12. Two fair 6-sided dice are thrown, one red and one blue. What is the probability that the red die has a score that is strictly greater than the score of the blue die?
- (A) 0.333                      (B) 0.500                      (C) 0.417                      (D) 0.583
13. It is found that the probability that a student at a large university has a Visa credit card is 0.6 and the probability that a student at the same university has a Mastercard is 0.4. It is also found that the probability that a student at the university has at least one of these two types of credits cards is 0.7. What is the probability that a randomly selected student at the university has both credit cards?
- (A) 0.24                      (B) 0.30                      (C) 0.20                      (D) 0.42

**Use the following information for the next TWO questions:**

A car repair can be performed either on time or late, and either satisfactorily or unsatisfactorily. The probability of a repair being on time and satisfactory is 0.26. The probability of a repair being on time is 0.74. The probability of a repair being satisfactory is 0.41.

14. What is the probability of a repair being late and unsatisfactory?
- (A) 0.59                      (B) 0.05                      (C) 0.48                      (D) 0.11
15. If a car repair is on time, what is the probability that it is not satisfactory?
- (A) 0.649                      (B) 0.418                      (C) 0.713                      (D) 0.552
16. A system has three computers. Computer 1 works with a probability of 0.88, computer 2 works with a probability of 0.78 and computer 3 works with a probability of 0.85. Suppose that the operations of the computers are independent of each other and that the system works if at least two of the computers are working. What is the probability that the system works?
- (A) 96.4%                      (B) 88.9%                      (C) 93.1%                      (D) 92.3%

17. City crime records show that 20% of all crimes are violent and 80% are non-violent. Of those crimes that are violent, 58% of them are reported to the police, while only 35% of crimes that are non-violent are reported to the police. If a crime has just been reported to the police, what is the probability it was a violent crime?
- (A) 39.6%                      (B) 29.3%                      (C) 62.4%                      (D) 11.6%
18. A menu has 5 appetizers, 3 soups, 7 main courses, 6 salads and 8 desserts. In how many ways can a four-course meal be chosen if either an appetizer or a soup is ordered, but not both?
- (A) 2688                      (B) 5040                      (C) 3210                      (D) 3618
19. Which of the following probability statements is (are) true?
- (I)  $P(A \cap B') + P(A' \cap B') = 1 - P(B)$   
 (II)  $P(A|B) = 1 - P(A|B')$
- (A) Both                      (B) (I) only                      (C) (II) only                      (D) Neither
20. Ten people have been chosen and their names put in a bowl. There are 3 prizes available to be won and the winner of each prize will be chosen randomly out of the bowl. The game is set up so that a person can win more than one prize. How many different combinations of winners are there?
- (A) 604,800                      (B) 720                      (C) 120                      (D) 1,000
21. A contractor is required by a county planning department to submit 1, 2, 3, 4 or 5 forms (depending on the nature of the project) in applying for a building permit. Let  $x$  = the number for forms required from the next applicant. The probability that  $x$  forms are required is  $p(x) = kx$  for  $x = 1, 2, 3, 4, 5$ . What is the value of  $k$ ?
- (A) 0.033                      (B) 0.045                      (C) 0.067                      (D) 0.075

**Use the following information for the next TWO questions:**

A paving company is using a new type of paving material on a long stretch of road. The number of defects in the paving after the road has been initially paved follows a Poisson distribution and averages 0.4005 per 5-km stretch.

22. The paving company is only interested in 5-km sections where there is at least 1 defect in the paving. A random sample of 15 of these 5-km sections of road was taken. What is the probability that in more than 1, but no more than 3, of these 15 sections there were at least one defect in the paving?
- (A) 8.1%                      (B) 21.5%                      (C) 6.1%                      (D) 19.6%
23. What is the probability that in a 20-km stretch of newly paved road, there will be at least 4 defects in the paving?
- (A) 0.08%                      (B) 7.91%                      (C) 2.38%                      (D) 28.06%
24. A random variable,  $x$ , follows a binomial distribution with  $n = 40$  and  $p = 0.95$ . Which of the following would best describe the shape of the distribution of  $x$ ?
- (A) Slightly skewed to the left                      (B) Strongly skewed to the left  
 (C) Slightly skewed to the right                      (D) Strongly skewed to the right

**Use the following information for the next THREE questions:**

Airlines sometimes overbook flights. Suppose that for a plane with 50 seats, 55 passengers have tickets. Define the random variable  $y$  as the number of ticketed passengers who actually show up for the flight. The probability function of  $y$  is shown in the following table:

$y$	45	46	47	48	49	50	51	52	53	54	55
$p(y)$	0.05	0.10	0.12	0.14	0.25	0.17	0.06	0.05	0.03	0.02	0.01

25. What is the probability that the flight will not accommodate all ticketed passengers who show up?  
(A) 0.11                      (B) 0.17                      (C) 0.31                      (D) 0.34
26. If you are the third person on the standby list (which means you will be the third one to get on the plane if there are any seats available after all ticketed passengers have been accommodated), what is the probability that you will be able to take the flight?  
(A) 0.41                      (B) 0.15                      (C) 0.27                      (D) 0.65
27. The expected number of ticketed passengers who actually show up for the flight is 48.84. What is the standard deviation of the number of ticketed passengers who actually show up for the flight?  
(A) 2.12                      (B) 2.88                      (C) 3.31                      (D) 3.66
28. At a large corporation in London, the senior executives need to travel by train to Toronto from time to time. The following is the probability distribution for the random variable  $y$  = number of senior executives who travel by train to Toronto per month:

$y$	0	1	2	3	4	5	6	7	8
$p(y)$	0.10	0.14	0.21	0.22	0.15	0.06	0.05	0.04	0.03

You are interested in the months where there are 2 or fewer executives who travel by train to Toronto.

Define:  $x$  = number of months where there are 2 or fewer executives who travel by train to Toronto

In a 10-month period, what is the probability there will be at least 2 but less than 4 months where there are 2 or fewer executives who travel by train to Toronto?

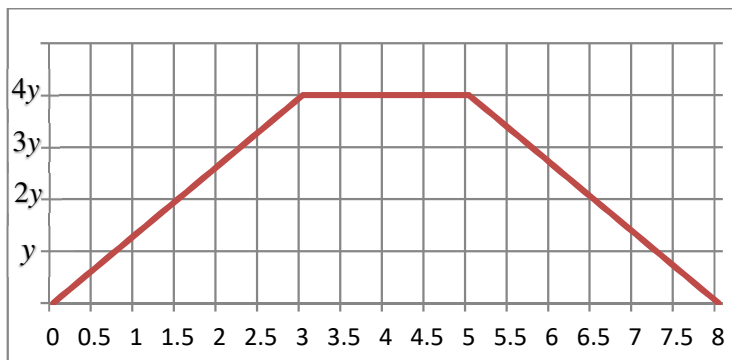
- (A) 43.0%                      (B) 58.0%                      (C) 48.1%                      (D) 24.3%
29. In a survey of Americans, respondents were asked “What is your favourite sport to watch?” Football and basketball ranked number 1 and 2 in terms of preference. Assume that in a group of 10 individuals, seven (7) prefer football and three (3) prefer basketball. A random sample of 3 of these individuals is selected. What is the probability that the majority (either two or three) prefer football?  
(A) 84.7%                      (B) 66.7%                      (C) 81.7%                      (D) 78.4%
30. A random variable,  $y$ , follows a binomial distribution with parameters  $n$  and  $p$ . The mean of  $y$  is 21 and the standard deviation of  $y$  is 3.6946. What is the value of  $n$ ? (answer to nearest integer)  
(A) 60                      (B) 25                      (C) 119                      (D) 32

31. The probability of a bank making a mistake in processing a deposit is 0.004. If 1200 deposits are audited, what is the probability that more than four (4) mistakes were made in processing deposits? Use the Poisson approximation (if allowed).
- (A) 52.4%                      (B) 70.6%                      (C) 53.2%  
 (D) Should not use the Poisson approximation in this situation

**Use the following information for the next TWO questions:**

The diameters of Douglas fir trees grown at a Christmas tree farm are normally distributed with a mean of 12.5 cm and a standard deviation of 3.2 cm.

32. You have a Christmas tree stand at home that will expand to a diameter of 14 cm. What proportion of trees will not fit in your Christmas tree stand?
- (A) 68.9%                      (B) 46.9%                      (C) 31.9%                      (D) 53.1%
33. Between what two values would give the IQR of Douglas fir tree diameters?
- (A) (6.23, 18.77)              (B) (10.34, 14.66)              (C) (10.90, 14.10)              (D) (9.30, 15.70)
34. Let the random variable  $x$  = amount of time a student spends on this question. The variable can take on the values  $0 \leq x \leq 8$  according to the following density curve:



What is the probability that students spend between 3.5 and 6.5 minutes of this question?

- (A) 45.0%                      (B) 52.5%                      (C) 60.0%                      (D) 46.9%
35. According to a recent study, the weight of male brains is normally distributed with a mean of 1400 grams and a standard deviation of 110 grams. What weight do 40% of males have a brain weight less than?
- (A) 1397 grams              (B) 1472 grams              (C) 1373 grams              (D) 1428 grams
36. You are waiting to pick up a friend who is taking a flight from New York City to Chicago. Due to weather and other things, the length of the flight varies. Assume the flight time follows a uniform distribution between 122 and 147 minutes. If a flight is known to take more than 125 minutes, what is the probability that it will take less than 135 minutes?
- (A) 52.0%                      (B) 40.0%                      (C) 59.1%                      (D) 45.5%

37. Person A has chosen a sampling technique that has homogeneity (similar objects) within groups, while Person B has chosen a sampling technique where out of a large group of 2000 people, to get a sample of 40 people, every 50<sup>th</sup> person is chosen. What type of sampling techniques is being used by each person? Answer is given as (Person A, Person B)
- (A) Cluster Sampling, Simple Random Sampling      (B) Stratified Sampling, Systematic Sampling  
 (C) Stratified Sampling, Simple Random Sampling      (D) Cluster Sampling, Systematic Sampling
38. A 94% confidence interval for  $\mu$ , where  $\sigma$  is known, was determined to be (1205.80, 1324.20), based on a sample size of 75 drawn from a normal population. What is the population standard deviation?
- (A) 261.6                      (B) 545.4                      (C) 329.7                      (D) 272.7
39. Suppose oysters contain pearls with a diameter in millimetres (mm) that follows a uniform distribution on (0, b). The variance of the diameters is 12. What is the probability that an oyster contains a pearl with a diameter of at least 4 mm?
- (A) 67%                      (B) 50%                      (C) 33%                      (D) Cannot be determined
40. The time taken by a randomly selected applicant for a mortgage to fill out a certain form has a normal distribution with mean value of 10 minutes and standard deviation of 2 minutes. If six (6) individuals fill out a form, one after the other, what is the probability that the total time taken to fill out the forms is at most 66 minutes?
- (A) 0.6915                      (B) 0.8888                      (C) 0.9987                      (D) 0.5793
41. Dr. Jones wanted to estimate the mean cholesterol level for all adult men living in London. He took a random sample of 25 adult men from London and found that the mean cholesterol level was 186 with a standard deviation of 12. Assuming that cholesterol levels for all adult men in London are normally distributed, what is the margin of error for a 95% confidence interval for the population mean,  $\mu$ ?
- (A) 4.11                      (B) 6.71                      (C) 4.70                      (D) 4.95
42. Suppose that 25% of all students at a large university receive financial aid. Let  $x$  be the number of students in a random sample of size 50 who receive financial aid. Using the normal approximation, what is the probability that between 5 and 15 (inclusive) of the selected students receive financial aid? (i.e.,  $5 \leq x \leq 15$ ).
- (A) 78.68%                      (B) 73.77%                      (C) 83.20%                      (D) 82.55%
43. Studies have shown that approximately 10% of people are left-handed. What is the probability that in a class of 150 statistics students that less than 6% are left-handed?
- (A) 0.0197                      (B) 0.0071                      (C) 0.0010                      (D) 0.0516

**Use the following information for the next THREE questions:**

A Bay Street analyst estimates that the annual return from the stock of ABC Company comes from a normal distribution with a mean of 8.0% and a standard deviation of 1.5%. A return greater than 5% is considered satisfactory and a return greater than 10% is considered excellent.

44. What is the probability that the return on the stock is unsatisfactory?
- (A) 0.9772                      (B) 0.0228                      (C) 0.0918                      (D) 0.9082
45. What is the 90<sup>th</sup> percentile for returns on the stock?
- (A) 6.08%                      (B) 9.92%                      (C) 8.90%                      (D) 9.35%

46. What is the probability that the average return on this stock over a randomly selected 4-year period will be between 6.6% and 9.0%?
- (A) 0.1546                      (B) 0.8775                      (C) 0.9962                      (D) 0.5899
47. Suppose we have a normal population where  $\sigma$  is unknown. A confidence interval is given as (3.202, 3.854) with  $n = 14$  and  $s^2 = 0.211871$ . Which confidence level was used to construct the interval?
- (A) 95%                      (B) 90%                      (C) 99%                      (D) 98%
48. The management of a cable company is trying to determine the proportion of customers who are likely to purchase a cable package. They want to present their results in a 95% confidence interval that has a width of no more than 0.10. When this question was asked two years ago, the company calculated a 95% confidence interval was calculated to be (0.3, 0.4). What is the minimum sample size needed in this case?
- (A) 323                      (B) 93                      (C) 369                      (D) 350
49. Let's say your statistics class has a total of 450 enrolled. You are asked to randomly select 5 students from the class using simple random sampling. You number the students from 001 to 450. The following is a set of random numbers (sorted into sets of 5 digits for convenience) you should use by starting on the far left and working your way to the right. What are the numbers of the 5 chosen students?
- 97336 09183 19792 41085 86385 57491 16704 23167 04024 45799 15059 22716 14422
- (A) 336 091 241 085 423                      (B) 336 319 410 491 167  
 (C) 360 319 410 167 423                      (D) 360 319 410 167 042

**Use the following information for the next TWO questions:**

An underwater salvage crew is searching for the wreckage of a ship thought to have sunk in a certain area. The time in days taken to locate a wreck in this area can be modeled by an exponential distribution with the expected number of days (mean) being 20.

50. If the crew is offered a bonus for locating the shipwreck within 7 days, what is the probability that they will receive the bonus?
- (A) 41.9%                      (B) 29.5%                      (C) 5.0%                      (D) 70.5%
51. Suppose the crew will call off the search if the shipwreck is not located within 4 weeks. If the crew has already been searching for 18 days, what is the probability that they will not find the wreck before the search is called off?
- (A) 16.0%                      (B) 62.7%                      (C) 60.7%                      (D) 39.3%
52. Suppose your population of interest is  $N = 1800$  first-year students attending a small university. It is known that the number of people sent text messages on a particular day by a first-year student had an average  $\mu = 7$  and a standard deviation  $\sigma = 6$ . You randomly select 100 first-year students from this university. What is the probability the sample mean number of different people texted exceeds 6?
- (A) 95.25%                      (B) 94.74%                      (C) 96.08%                      (D) 95.64%

53. In a test for a particular illness, a false-positive result is obtained 1 in 125 times the test is administered. If the test is administered to 15,000 people, what is the approximate probability of there being more than 135 false-positive results?
- (A) 9.18%                      (B) 7.78%                      (C) 8.53%  
 (D) Should not use the normal approximation in this situation
54. A random variable  $x$  follows a normal distribution with a mean of  $\mu$  and a known standard deviation  $\sigma$ . A random sample of size  $n$  is taken and a 90% confidence interval for  $\mu$  is calculated to be (750.40, 943.60). What would a 95% confidence interval for  $\mu$ ?
- (A) (731.90 , 962.10)                      (B) (616.81 , 1077.19)  
 (C) (573.35 , 1120.65)                      (D) (710.17 , 983.83)
55. It is known that 28% of a population exhibit a certain characteristic. In a sample of 140 members of the population, the probability of the sample proportion being less than  $k$  is 33%. What is  $k$ ?
- (A) 29.7%                      (B) 2.81%                      (C) 26.3%                      (D) 27.9%
56. Suppose that a potato chip company produces and sells packages of potato chips whose target weight is 50 grams. A quality control manager working for the company suspects that the variation in the actual weights of the 50-gram packages is larger than acceptable. In an attempt to estimate  $\sigma$ , the standard deviation of the weights of all of the 50-gram packages, the company takes a random sample of  $n = 10$  packages off the factory line. The random sample yields a sample variance of 3.8 grams<sup>2</sup>. Which of the following would be a 95% confidence interval for  $\sigma$ ? Assume the population of potato chip package weights is normally distributed.
- (A) (1.80 , 12.66)                      (B) (6.83 , 48.13)                      (C) (1.34 , 3.56)                      (D) (2.61 , 6.94)
57. Suppose that a random variable  $x$  follows a uniform distribution on  $(-3, 8)$ . What is the lower quartile of the distribution?
- (A) -0.25                      (B) 1.25                      (C) 2.75                      (D) 5.25
58. A payment voucher is a document that can be used as proof that a monetary transaction has occurred between two parties. John Smith is the chief financial officer of a company and he knows that 200 such vouchers have been issued over the last year. John suspects some irregularities, and since he does not have time to inspect each voucher, he instructs his staff to inspect the last 50 vouchers issued. John's sample is an example of:
- (A) Quota Sampling                      (B) Simple Random Sampling  
 (C) Systematic Sampling                      (D) Convenience Sampling
59. Which of the following factors would give a researcher a narrower confidence interval?
- (I) A lower confidence level.  
 (II) A greater population standard deviation.  
 (III) A bigger sample size.
- (A) (I) and (II)                      (B) (III) only                      (C) (I) and (III)                      (D) Correct answer is not given in A, B, C