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ENGINEERING ECONOMICS
ECO 1192

Practice Examination #3

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1. If you apply a breakeven analysis to two mutually exclusive projects that have the same revenues but different costs, which of the following criteria would you use to determine the range over which one project is better than another?
   a) maximum criterion
   b) minimum criterion
   c) minimum and maximum criteria
   d) none of these answers.

2. Scenario analysis allows an analyst to examine the sensitivity of a summary measure (e.g., Present Worth) to changes to individual project parameters.
   a) True
   b) False

QUESTIONS 3 TO 6

- A car manufacturer must decide on purchasing or making specific car parts.
  - The total cost ($) of making the car parts is $50,000 + 5x.
- The cost of buying the car parts from a manufacturer is C = 25x

where "x" represents the annual quantity of car parts.

3. What is the variable production cost of making 10,000 car parts?
   a) $50,000
   b) 100,000
   c) 150,000
   d) None of these answers.

4. What is the fixed production cost of making 10,000 car parts?
   a) 50,000 + 5x
   b) 50,000
   c) 25x
   d) None of these answers.

5. What is the breakeven point between buying and making car parts?
   a) 25
   b) 2,500
   c) Cannot be determined from the information given.
   d) None of these answers.

6. Over what range is it cheaper (less costly) to make car parts?
   a) Less than the breakeven point
   b) More than the breakeven point
   c) At the breakeven point
   d) None of these answers.

7. In an uncertain future environment, the decision-maker has sufficient information to determine the probability of occurrence of future events or outcomes.
   a) True
   b) False

8. When an analyst examines the impact of changing one project parameter at a time on a summary measure (e.g., Present Worth), the analyst is performing
   a) Breakeven analysis
   b) Capital rationing
   c) Scenario analysis
   d) None of these answers.

QUESTIONS 9 to 11

Projects	NPW of Profits			
	Future States of Nature			
	W	**X**	**Y**	**Z**
A	**20**	**15**	**16**	**18**
B	**16**	**10**	**12**	**20**
C	**12**	**19**	**14**	**11**
D	**17**	**10**	**9**	**14**
E	**11**	**14**	**8**	**10**

9. Based on the Laplace principle, the best project is
   a) A
   b) B
   c) C
   d) D
   e) E

10. Based on the Hurwicz principle (with an index of optimism = 0.6), the best project is
    a) A
    b) B
    c) C
    d) D
    e) E

11. The Maximax and Hurwicz principles are identical if the index of optimism is equal to
    a) 0
    b) 0.5
    c) 1
    d) 2
    e) None of the above answers.

QUESTIONS 12 to 18

A firm is considering the purchase of a truck for $200,000 fully installed. It is expected to last 3 years with a salvage value of $50,000 at that time.

- Annual revenues are expected to be $300,000 in the first year and to grow thereafter at an annual rate of 5%.
- Annual operating and maintenance costs are expected to be $100,000 in the first year and to grow thereafter at an annual rate of 3%.

1. Depreciate the truck using the DB method (d=25%)
2. The half-year rule **does not** apply.
3. The before-tax with inflation interest rate is 20%.
4. The before-tax inflation-free interest rate is 15%.
5. The after-tax with inflation interest rate is 10%.
6. The after-tax inflation-free interest rate is 5%.
7. Inflation is 5% annually.
8. The tax rate = 50%

The firm gets a $100,000 loan (at a 10% rate of interest) which is repaid as follows:

Loan Repayment at End of Year	Percentage of Loan Repaid
1	20%
2	30%
3	50%

	Years			
Item	**0**	**1**	**2**	**3**
1. BTCF (Actual $)	**-200,000**	**AA**	**BB**	
2. BTCF (Constant $)	**CC**	**DD**	**EE**	
3. Interest on Loan				
4. Depreciation				
5. Taxable Income				
6. Taxes Payable				
7. ATCF (Actual $)				
8. ATCF (Constant $)	**FF**			
9. Repayment of Loan				
3. Interest on Loan				
10. CFOE (Actual $)				
11. CFOE (Constant $)	**GG**			

12. The dollar value of **AA** is
    a) 200,000
    b) $200,000(1+0.05)^{-1}$
    c) $200,000(1+0.10)^{-2}$
    d) $200,000(1+0.15)^{-3}$

13. The dollar value of **BB** is
    a) $300,000(1.05)-100,000(1.03)^{-1}$
    b) 300,000-100,000
    c) 300,000(1.05)-100,000(1.03)
    d) $300,000(1.05)^{-1}-100,000(1.03)^{-1}$

14. The dollar value of **CC** is
    a) -200,000
    b) -200,000(1+0.05)
    c) $-200,000(1+0.05)^{-1}$
    d) $-200,000(1+0.05)^{-2}$
    e) None of the above answers.

15. The dollar value of **DD** is
    a) 200,000
    b) $200,000(1+0.05)^{-1}$
    c) $200,000(1+0.10)^{-2}$
    d) None of these answers.

16. The dollar value of **EE** is
    a) 300,000(1.05)-100,000(1.03)
    b) 300,000-100,000
    c) {300,000(1.05)-100,000(1.03)}(P/F,5%,2)
    d) $300,000(1.05)^{-1}$-$100,000(1.03)^{-1}$

17. The dollar value of **FF** is
    a) -200,000
    b) -200,000(1+0.05)
    c) $-200,000(1+0.05)^{-1}$
    d) $-200,000(1+0.05)^{-2}$
    e) None of the above answers.

18. The dollar value of **GG** is
    a) -200,000
    b) -100,000
    c) -200,000(1+0.05)
    d) -100,000(1+0.05)
    e) None of the above answers.

QUESTIONS 19 TO 22

- Mary bought a five-year $20,000 Guaranteed Income Certificate (GIC) on January 1, 2010 (for which she paid $20,000).
- She will receive $1,300 in interest income on December 31 from 2010 to 2014.
- The GIC will mature on December 31, 2014 at which time Mary will receive, in addition to her last interest payment of $1,300, the $20,000 that she invested on January 1, 2010.
- During this period, annual inflation is expected to be 5 percent.

19. What is Mary's precise nominal (with inflation) rate of interest on the GIC?
    a) Solve for i* from 20,000 = 1,300(P/A,i*,5)
    b) 100(1,300/20,000)
    c) 5.00%
    d) None of these answers

20. What is Mary's precise real (inflation-free) rate of interest on the GIC?
    a) (1+nominal rate)(1+inflation rate) -1
    b) Nominal rate – inflation rate
    c) {(1+nominal rate)/(1+inflation rate)} - 1
    d) Inflation rate (=5.00%)
    e) None of these answers

21. If the annual interest income Mary receives from the GIC can be reinvested at the nominal rate in question 18 during the 5-year life of the GIC, what will be the value of her $20,000 investment and interest income on December 31, 2014 in current (nominal) dollars?
    a) $20,000(P/F,nominal rate,5)
    b) $20,000(F/P,nominal rate,5)
    c) $1,300(F/A,nominal rate,5)^5
    d) $20,000+5(1,300)
    e) None of the above answers.

22. What is the inflation-free dollar value of the interest income Mary receives at the end of the 4th year (i.e., on December 31, 2013)?
    a) $1,300(P/F,5%,3)
    b) $1,300(P/F,5%,4)
    c) $1,300(F/P,5%,4)
    d) $1,300(F/A,5%,4)
    e) None of these answers.

QUESTIONS 23 TO 30

P = $100,000; SV = $10,000; AR = $100,000
AC = $50,000; N = 10 years; MARR = 10%

PRESENT WORTH VALUES

	-15%	-10%	-5%	Base Case	5%	10%	15%
P ($)	**AA**						
SV ($)							
AR ($)							**BB**
AC ($)							
N (yrs)		**CC**					
MARR (%)						**DD**	

23. The Present Worth of cell **AA** is
    a) -100,000+(100,000-50,000)(P/A,10%,10)(1.15)+10,000(P/F,10%,10)
    b) -100,000(1.15)+(100,000-50,000)(F/A,10%,10)+10,000(P/f,10%,10)
    c) -100,000(0.85) + (100,000-50,000)(P/A,10%,10)+10,000(P/F,10%,10)
    d) -100,000(0.85)+(100,000-50,000)(P/A,10%,10)+10,000(0.85)(P/F,10%,10)
    e) None of the above answers.

24. The Present Worth of cell **BB** is
    a) -100,000+(100,000-50,000)(P/A,10%,10)(1.15)+10,000(P/F,10%,10)
    b) -100,000(1.15)+(100,000-50,000)(F/A,10%,10)+10,000(P/f,10%,10)
    c) -100,000 + (100,000(1.15)-50,000)(P/A,10%),10)+10,000(P/F,10%,10)
    d) -100,000+(100,000-50,000)(P/A,10%(1.1),10)+10,000)(P/F,10%(0.9),10)
    e) None of the above answers.

25. The Present Worth of cell **CC** is
    a) -100,000+(100,000-50,000)(P/A,10%,10)(1.15)+10,000(P/F,10%,10)

b) -100,000+(100,000-50,000)(P/A,10%,10(0.9))+10,000(P/F,10%,10(o.9))
c) -100,000(0.85) + (100,000-50,000)(P/A,10%,10)+10,000(P/F,10%,10)
d) -100,000(0.85)+(100,000-50,000)(P/A,10%,10)+10,000)(0.85)(P/F,10%,10)
e) None of the above answers.

26. The Present Worth of cell **DD** is
a) -100,000+(100,000-50,000)(P/A,10%(1.1),10)+10,000(P/F,10%(1.1),10)
b) -100,000(1.15)+(100,000-50,000)(F/A,10%,10)+10,000(P/F,10%,10)
c) -100,000(0.85) + (100,000-50,000)(P/A,10%,10)+10,000(P/F,10%,10)
d) -100,000(0.85)+(100,000-50,000)(P/A,10%,10)+10,000)(0.85)(P/F,10%,10)
e) None of the above answers.

27. Which project parameter is most influential on the decision criteria (PW in this case)?
a) Initial cost (P)
b) Annual revenues (OR)
c) Annual cost (OC)
d) MARR
e) Project life (N)

28. Which project parameter is least influential on the decision criteria (PW in this case)?
a) Initial cost (P)
b) Annual revenues (OR)
c) Annual cost (OC)
d) MARR
e) Salvage value (SV)

29. What dollar value (nearest $100) of the initial cost would lead to project breakeven (PW=$0)?
a) -$100,000
b) -$200,000
c) -$311,100
d) None of these answers.

30. What dollar value (nearest $100) of the annual operating revenues would lead to project breakeven (PW=$0)?
a) $65,600
b) $100,000
c) $165,600
d) None of these answers.

QUESTIONS 31 to 32

The economic viability of a specific project depends on its deterministic and random variables.

Project managers are convinced that the three following project parameters are known with **complete certainty**:

- MARR = 10%
- Life = 10 years

The four project variables are:

1. Initial cost (three possible values as shown in the following table)
2. Annual revenues (four possible values as shown in the following table)
3. Annual cost (three possible values as shown in the following table).
4. Salvage value (two possible values as shown in the following table).

Initial Cost ($)	**Annual Revenues**	**Annual Cost**	**Salvage Value**
$5,000	**$10,000**	**$4,000**	**$2,000**
$6, 000	**$15,000**	**$6,000**	**$3,000**
$7,000	**$20,000**	**$8,000**	
	$25,000		

31. The 10th simulation of a project's NPW is calculated from a combination of deterministic and random variables. If the random number associated with the annual revenue variable for this simulation were 0.6, the calculation of the NPW would be based on annual revenues of
    a) $10,000
    b) $15,000
    c) $20,000
    d) $25,000

32. The 50th simulation of the project's NPW is also calculated from a combination of deterministic and random variables. If the random number associated with the salvage value variable were 0.8, the calculation of the NPW would be based on a salvage value of
    a) $2,000
    b) $3,000

QUESTION 33-36

This table provides information on the discrete random project variables and their probabilities of occurrence.

First Cost (P)		
P1 =	**20,000**	**0.4**
P2 =	**32,000**	**0.6**
Net annual revenues (AR-AC)		
AR1-AC1 =	**15,000**	**0.7**
AR2 - AC2 =	**25,000**	**0.3**
Salvage Value (SV)		
SV1 =	**2,000**	**0.2**
SV2 =	**5,000**	**0.8**
MARR		
MARR1 =	**8%**	**0.9**
MARR2 =	**10%**	**0.1**
Project Life (N)		
N1 =	**5**	**0.7**
N2 =	**10**	**0.3**

33. What is the expected first cost?
    a) $26,000
    b) $20,000
    c) (20,000+32,000)÷2
    d) 0.4(20,000)+0.6(32,000)
    e) None of the above answers.

34. The method of using the expected values of a project's variables to determine its NPW is known as
    a) Monte Carlo simulation.
    b) The expected value of the project's NPW.
    c) The NPW of expected values.

d) Sensitivity analysis.

35. The method of using all possible combinations of a project's variables to determine its NPW is known as
a) Monte Carlo simulation.
b) The expected value of the project's NPW.
c) The NPW of expected values.
d) Sensitivity analysis.

36. The method of randomly selecting a project's variables to determine its NPW is known as
a) Monte Carlo simulation.
b) The expected value of the project's NPW.
c) The NPW of expected values.
d) Sensitivity analysis.

37. Which of the following answer(s) do(es) not apply to a project's critical path?
a) It is the project path with the longest duration.
b) The activities on the critical path have no slack (float).
c) The critical path can change as activities are crashed.
d) Answers a), b) and c) apply to the critical path.
e) Answer b) does not apply to the critical path.

38. Which of the following answers is incorrect?
a) EF = ES + T
b) LS = LF - T
c) ES = Min(EF of immediate predecessors)
d) LF = Min(LS of successor activities)
e) S = LS – ES = LF - EF

0-0-0-0-0-0

Question	Answer
1	B
2	B
3	A
4	B
5	B
6	B
7	B
8	D
9	A
10	A
11	C
12	A
13	C
14	A
15	C
16	C
17	A
18	B
19	C
20	B
21	B
22	B
23	C
24	C
25	B
26	A
27	B
28	E
29	C
30	A
31	C
32	B
33	D
34	C
35	B
36	A
37	D
38	C