**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

1) There is a fixed cost of $50,000 to start a production process. Once the process has begun, the variable cost per

unit is $25. The revenue per unit is projected to be $45. Write a mathematical expression for total cost.

2) Administrators at a university are planning to offer a summer seminar. It costs $3000 to reserve a room, hire an

instructor, and bring in the equipment. Assume it costs $25 per student for the administrators to provide the

course materials. If we know that 20 people will attend, what price should be charged per person to break even?

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

3) Which of the following is incorrect with respect to the use of models in decision making? 3)

A) they are generally easy to use

B) they promote subjectivity in decision making

C) they provide a systematic approach to problem solving

D) they improve understanding of the problem

4) The quantitative analysis approach requires 4)

A) uncomplicated problems

B) mathematical expressions for the relationship

C) the manager to have prior experience with similar problems

D) all of the above

5) A decrease in fixed costs with everything else remaining constant 5)

A) increases the break-even point

B) decreases the break-even point

C) keeps the break-even point at the same level

D) does not affect the level of the break-even point

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

6) Jim is considering pursuing an MS in Information Systems degree. He has applied to two different universities.

The acceptance rate for applicants with similar qualifications is 20% for University X and 45% for University Y.

What is the probability that Jim will be accepted by at least one of the two universities?

7) For a standard normal distribution, what is the probability that z is greater than 1.75?

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

8) Employees of a local company are classified according to gender and job type. The following table

summarizes the number of people in each job category.

Male (M) Female (F)

Job

Administrative (AD) 110 10

Salaried staff (SS) 30 50

Hourly staff (HS) 60 40

If an employee is selected at random, what is the probability that the employee is female given that

the employee is a salaried staff member.

8)

A) .625 B) .70 C) .50 D) .1667 E) .60

9) A fair die is rolled nine times. What is the probability that an odd number (1,3 or 5) will occur less

than 3 times?

9)

A) .0899 B) .7456 C) .2544 D) .9916 E) .9101

10) \_\_\_\_\_\_\_\_\_\_ is a measure of the dispersion of random variable values about the expected value or

mean.

10)

A) Standard deviation

B) Sample mean

C) Population mean

D) Variance

E) A and D

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

11) s1 s2 s3

d1 10 8 6

d2 14 15 2

d3 7 8 9

What decision should be made by the optimistic decision maker?

12) s1 s2 s3

d1 10 8 6

d2 14 15 2

d3 7 8 9

If the probabilities of s1, s2, and s3 are 0.2, 0.4, and 0.4, respectively, What is the EVPI?

13) The local operations manager for the IRS must decide whether to hire 1, 2, or 3 temporary workers. He

estimates that net revenues will vary with how well taxpayers comply with the new tax code.

# of Workers

Low

Compliance

Medium

Compliance

High

Compliance

123

50

100

150

50

60

70

50

20

-10

If he thinks the chances of low, medium, and high compliance are 20%, 30%, and 50% respectively, what are the

expected net revenues for the number of workers he will decide to hire?

14) A manufacturer must decide whether to build a small or a large plant at a new location. Demand at the location

can be either small or large, with probabilities estimated to be 0.4 and 0.6 respectively. If a small plant is built,

and demand is large, the production manager may choose to maintain the current size or to expand. The net

present value of profits is $223,000 if the firm chooses not to expand. However, if the firm chooses to expand,

there is a 50% chance that the net present value of the returns will be 330,000 and 50% chance the estimated net

present value of profits will be $210,000. If a small facility is built and demand is small, there is no reason to

expand and the net present value of the profits is $200,000. However, if a large facility is built and the demand

and the demand turns out to be small, the choice is to do nothing with a net present value of $40,000 or to

stimulate demand through local advertising. The response to advertising can be either modest with a

probability of .3 or favorable with a probability of .7. If the response to advertising is modest the net present

value of the profits is $20,000. However, if the response to advertising is favorable, then the net present value of

the profits is$220,000. Finally, the when large plant is built and the demand happens to be high, the net present

value of the profits $800,000. Draw a decision tree and determine the payoff for each decision and event node.

Which alternative should the manufacturer choose and what is the expected value?

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

15) A tabular presentation that shows the outcome for each decision alternative under the various

possible states of nature is called a

15)

A) feasible region B) payoff table

C) payback matrix D) decision tree

16) A table of random numbers must be 16)

A) uniform B) absent of patterns

C) efficiently generated D) all of the above

17) If the probability of an event is 0.36, what random number range specifies this properly? 17)

A) 0.40 - 0.50 B) 0.30 - 0.40 C) 0.10 - 0.20 D) 0.20 - 0.30

18) Validation of the simulation model deals with the 18)

A) sensitivity of the solution B) computation of the random numbers

C) determination of the random numbers D) determination of the solution

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

19) SmallTown Taxi operates one vehicle during the day. They are considering adding a second vehicle to the fleet.

To determine whether or not to add a second vehicle, they are going to simulate their taxi service. Distributions

of the time between taxi calls and the distribution of the time to drive a customer to their destination have been

determined

Use the table below to manually simulate 8 calls. The time of the call and the service time have already been

determined.

Arrival

Number

Time of

Call

Time of

Pickup

Service

Time

Tim eof

Drop-off

Customer

Wait Time

Cab

Wait Time

1 15 15 25 40 0 15

2 45 45 25 70 0 5

3 70 15

4 95 45

5 125 15 155

6 150 35

7 175 190 25 15 0

8 205 25 240 10 0

Calculate the average waiting time per customer.

Calculate the utilization of the taxi.

20) The number of cars arriving at Joe Kelly's oil change and tune-up place during the last 200 hours of operation is

observed to be the following:

Number of

Cars Arriving Frequency

3 or less

4

12

678

9 or more

0

10

30

70

50

40

0

Based on the above frequencies, two digit random numbers are used and the following random number ranges

have been developed.

Number of

Cars Arriving

Random Number

of Ranges

4 00-04

5 05-19

6 .20-54

7 .55-79

Using the following sequence of random numbers, simulate 6 hours of car arrivals at Joe Kelly's oil change and

tune-up facility. What is the average number of arrivals? Random numbers: 92, 44, 15,77,21,38.

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**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

21) Given an actual demand of 59, a previous forecast of 64, and an alpha of .3, what would the forecast

for the next period be using simple exponential smoothing?

21)

A) 36.9 B) 65.5 C) 57.5 D) 60.5 E) 62.5

22) The lower the value of the \_\_\_\_\_\_\_\_\_\_, relative to the magnitude of the data, the more accurate the

forecast.

22)

A) forecast error B) forecast mistake

C) forecast accuracy D) MAD

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

23) Robert wants to know if there is a relation between money spent on gambling and winnings:

Money Spent Money Won

16

12

18

14

330

270

380

300

If he spends $20, how much can he expect to win if he uses regression analysis?

24) The following data summarizes the historical demand for a product

Month Actual

Demand

March 20

April 25

May 40

June 35

July 30

August 45

Use a four period moving average and determine the forecasted demand for September and the average

forecast error.

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

25) If average forecast error is positive, it indicates that the forecast is biased high. 25)