**ASSIGNMENT-2**

**Week 5 –week 7**

**QUANTITATIVE METHODS**

**(STAT-201)**

**Student Full Name**:

**Student ID**:

**CRN No**.:

**Note**: 1. All the questions are compulsory.

 2. Due date: March 20, 2017 11:59 PM.

 3. Points: Section-I 1×6=6

 Section-II 1×6=6

 Section-III 6×3=18

 Total 30

**Section-I**

***State whether the following statements are True or False.* (1×6 = 6)**

1. When we want to use one variable to predict another and use the equation $y=a+bx$ , we use the technique known as multiple regression.
2. True
3. False
4. When using regression, an error is also called residual.
5. True
6. False
7. Most systems use the queue discipline known as FIFO rule.
8. True
9. False
10. In a multichannel, single-phase queuing system, the arrival will pass through at least two different service facilities.
11. True
12. False
13. In an LP problem, at least one corner point must be an optimal solution if an optimal solution exists.
14. True
15. False
16. In a linear program, the constraints must be linear, but the objective function may be non-linear.
17. True
18. False

**Section-II**

***Circle/tick the right answer from the answers given below.* (1×6 = 6)**

1. In regression model, if every sample point is on regression line (all errors are 0), then
2. The correlation coefficient would be 0.
3. The correlation coefficient would be $-1$ or 1.
4. The coefficient of determination would be $-1$.
5. The coefficient of determination would be 0.
6. A graph of the sample points that will be used to develop a regression line is called
7. A sample graph
8. A regression diagram
9. A scatter diagram
10. A regression plot
11. The utilization factor for a system is defined as
12. Mean no. of people served divided by the mean no. of arrivals per time period
13. The average time a customer spends waiting in a queue
14. Proportion of the time the service facilities are in use
15. The percentage of idle time
16. A queuing system described as M/D/2 would have
17. Exponential service times
18. Two queues
19. Constant service times
20. Constant arrival rates
21. A feasible solution to an LPP
22. Must satisfy all of the problem’s constraints simultaneously
23. Need not satisfy all of the constraints, only some of them
24. Must be a corner point of the feasible region
25. Must give the maximum possible profit
26. A graphical method should only be used to solve an LPP when
27. There are only two constraints
28. There are more than two constraints
29. There are only two variables
30. There are more than two variables

**Section-III**

**Answer the following Essay Type Questions (6×3=18)**

1. Judith Thompson runs a florist shop on the Gulf Coast of Texas, specializing in floral arrangements for weddings and other special events. She advertises weekly in the local newspapers and is considering increasing her advertising budget. Before doing so, she decides to evaluate the past effectiveness of those ads. Five weeks are sampled, and the advertising dollars and sales volume for each of these is shown in following table:

|  |  |
| --- | --- |
| Sales($1,000)(Y) | Advertising ($100) (X) |
| 11 | 5 |
| 6 | 3 |
| 10 | 7 |
| 6 | 2 |
| 12 | 8 |

1. Develop a regression equation that would help Judith to evaluate her advertisement.
2. Forecast the Sale  when.
3. Find the coefficient of determination for the model obtained in above Question 1.
4. From historical data, Harry’s Car Wash estimates that dirty cars arrive at the rate of 10 per hour all day Saturday. With a crew working the wash line, Harry figures that cars can be cleaned at the rate of one every 5 minutes. One car at a time is cleaned in this example of a single-channel waiting line.

Assuming Poisson arrivals and exponential service times, find the

1. Utilization rate of the car wash.
2. Average time a car waits before it is washed.
3. Average time a car spends in the service system.
4. The students patiently form a single line in front of the desk to wait for help at University. Student arrivals are best described by Poisson distribution with mean of 15 students per hour arriving at the help desk. The help desk server can help an average one student in 3 minutes, with the service rate being described by an exponential distribution. Calculate the following characteristics of the service system:
5. The average number of students in the system.
6. The average number of students waiting in the line.
7. Probability that no student is in the system.
8. The Electro comp Corporation manufactures two electrical products: air conditioners and large fans. The assembly process for each is similar in that both require a certain amount of wiring and drilling. Each air conditioner takes 3 hours of wiring and 2 hours of drilling. Each fan must go through 2 hours of wiring and 1 hour of drilling. During the next production period, 240 hours of wiring time are available and up to 140 hours of drilling time may be used. Each air conditioner sold yields a profit of $25. Each fan assembled may be sold for a $15 profit. Formulate this LP production mix situation.
9. Solve the LPP formulated above in Question 5 using corner point Graphical approach to find the best combination of air conditioners and fans that yields the highest profit.