Gulf University for Science and Technology
College of Arts and Sciences

Final Examination – Fall 2010

Course Code: Math 121 Basic Probability and Statistics
Date : January 8, 2011

Student Name:

Student Signature: _____   _____

Instructors:

Mr. Amer Marafie
Mr. Walid Al-Wagfi
Dr. Munir Mahmood
Dr. Harun Aydilek
Dr. Wassim Daher

You cannot share calculators. Usage of cell phones during the test for any reason is forbidden. This examination has 19 pages including this cover page. Before you start the examination please verify the number of pages.

Show all your work to get full credit.
No Questions are allowed during the examination.

Score:

1	2	3	4	5	6	7	8	9	10	11	12	TOTAL

1. The relative frequency histogram below represents scores achieved by 300 applicants for a military post on their personality profile.
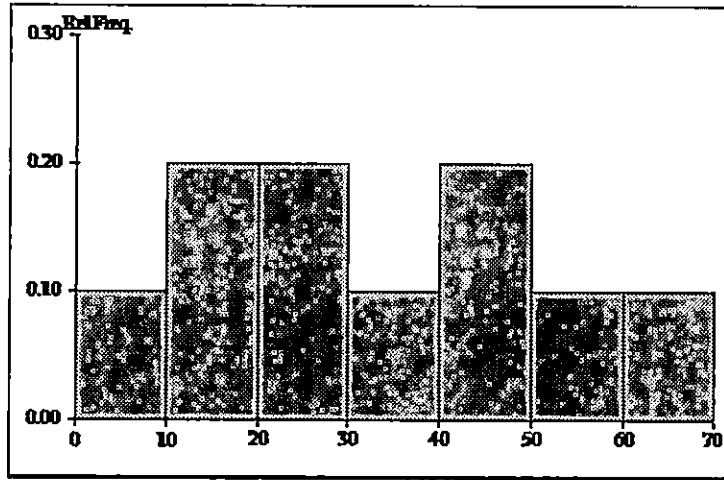
a) (2 points) What percent of the job applicants scored less than 40?

b) (4 points) How many applicants scored between 20 and 40 out of 300 applicants?

c) (2 points) What is the cumulative relative frequency for those who score less than 50?

2

2. A survey was conducted to determine the age of people attending night classes at a local community college. 20 students were asked about their age. The stem-and-leaf display of the data is shown below.

```
Stem   Leaves
   1 | 489
   2 | 26
   3 | 12678
   4 | 034 5789
   5 | 127
```

a) (2 points) What percentage of the respondents is age 30 or over?

b) (4 points) Arrange the data into classes with the first class 10 but less than 20, and fill the table given below.

Class	Frequency	Relative Frequency	Percent Frequency
10-19			
20-29			
30-39			
40-49			
50-59			

c) (3 points) Plot a histogram using the percent frequency.

3. Four observations taken for two variables follow.

x_i	6	11	14	21
y_i	6	9	8	17

a. (3 points) Construct a scatter diagram for the given data. What does the scatter diagram indicate about the relationship between x and y?

b. (6 points) Compute and interpret the sample correlation coefficient.

4. Given below are the temperature readings of a sample of 10 days during January in Kuwait.

10, 20, 21, 17, 16, 19, 18, 22, 21, 12

Compute

a. (1 point) The mean

b. (3 points) The quartiles Q1, Q2 and Q3

c. (1 point) The Inter-quartile Range

d. (1 point) The mode

e. (3 points) Draw the box-plot

5

5. If $P(B) = 0.4$, $P(A \mid B) = 0.35$ and $P(A \cup B) = 0.69$

    a. (4 points) Find $P(A \cap B)$

    b. (3 points) Find $P(A)$

    c. (2 points) Are A and B independent? Explain your answer.

6. A survey of a sample of business students resulted in the following information regarding the genders of the individuals and their selected major.

Selected Major

Gender	Accounting	Marketing	Others	Total
Male	45	10	40	95
Female	25	20	60	105
Total	65	30	100	200

a. (2 points) What is the probability of selecting an individual who is majoring in Marketing?

b. (3 points) What is the probability of selecting an individual who is majoring in Accounting, given that the person is female?

c. (3 points) Given that a person is majoring in Marketing, what is the probability that the person is male?

7: Past history indicates that on average **120** calls per hour are received at a call center.

    a.   (2 points) What is the probability that 6 calls will be received during the next 5 minutes?

    b.   (3 points) What is the probability that at least 2 calls will be received in two minutes?

    c.   (3 points) What is the probability that at least 3 but less than 6 calls will be received in two minutes?

8. The probability distribution for the number of cars owned by individuals is

# of Cars(X)	Probability
0	0.2
1	0.1
2	0.3
3	0.3
4	0.1

a. (2 points) What is the probability that a randomly selected person will have more than 2 cars?

b. (3 points) What is the expected value of X?

c. (4 points) What is the standard deviation of the variable X?

9. In a survey conducted by HR Management Society, 30 % of workers said that employers have the right to monitor their telephone use. Suppose that a random sample of 12 workers is selected, and they are asked if employers have the right to monitor telephone use. (Hint : Use Binomial Distribution)

    a.   (3 points) What is the probability that at most 2 workers agree?

    b.   (3 points) What is the probability that no more than 10 workers agree?

    c.   (2 points) What is the probability that 4 workers disagree?

    d.   (2 points) What are the mean and the standard deviation of workers who disagree?

10. According to the historical data, the weight of new born babies is normally distributed with a mean of 3450 grams and a standard deviation of 250 grams. What is the probability that the weight of a randomly selected new born baby will be

a. (3 points) between 3300 and 3730 grams?

b. (3 points) more than 3800 grams?

c. (3 points) P(Weight $\leq$ x) = 0.6985, find x.

11

10. According to the historical data, the weight of new born babies is normally distributed with a mean of 3450 grams and a standard deviation of 250 grams. What is the probability that the weight of a randomly selected new born baby will be

a. (3 points) between 3300 and 3730 grams?

b. (3 points) more than 3800 grams?

c. (3 points) P(Weight $\leq$ x) = 0.6985, find x.

11. Z is a standard normal random variable.

a. (3 points) Find $P(-1.23 \leq Z \leq 1.76)$

b. (3 points) Given $P(Z \leq z_1) = 0.3557$, find z_1 (Hint: Find the value of z_1 such that the area to the left of z_1 is 0.3557).

c. (3 points) Given $P(z_2 \leq Z) = 0.2645$, find z_2 (Hint: Find the value of z_2 such that the area to the right of z_2 is 0.2645).

12. The time to fix the breaks of a car is uniformly distributed between 130 and 280 minutes.

a. (2 points) Write the probability density function and graph it.

b. (2 points) What is the probability that it will take more than 220 minutes to fix the breaks of a randomly selected car?

c. (2 points) What is the probability it will take between 240 and 320 minutes to fix the breaks of a randomly selected car ?

d. (2 points) How many minutes will it take to fix the breaks of 6 randomly selected cars?