Gulf University for Science and Technology
College of Arts and Sciences

Basic Probability and Statistics

Final Examination – Spring 2014

Course Code: MATH 121 Section:

Instructor: Date: May 24, 2014
(Please circle your instructor's name)

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Student Name:

Student Number: _____

Aids Allowed You can use a calculator, but it cannot be shared.
Instructions:

1. **There are 2 tables for Normal distribution.**
2. **Formulas and tables are provided as separate.**

This examination has a cover page, 10 pages with 11 questions. In addition, 3 pages for formula sheets and 2 pages for tables are provided. Before you start the examination please verify them.

No Questions are allowed during the examination
Student signature: _____

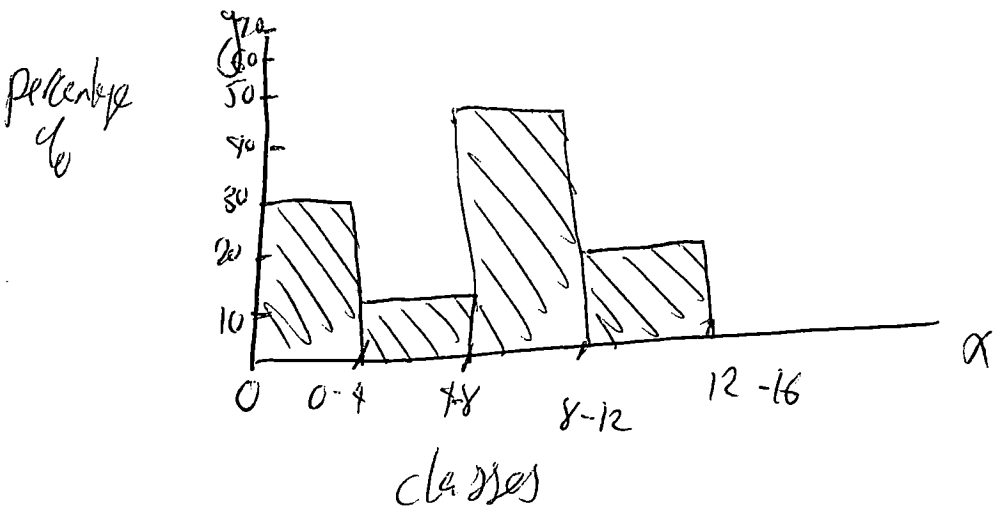
Objective	1	2		3		4	5		6		7	Total
Question	1	2	3	4	5	6	7	8	9	10	11	
Score per question												
Score per objective												
Out of	10	17		20		6	18		19		10	100

1. Number of absences of 20 students is summarized in the following table.

Absence Classes	Class Midpoint	Frequency	Percentage	Cumulative Percentage
0 but less than 4	2	6	30	30
4 but less than 8	6	2	10	80
8 but less than 12	10	9	45	85
12 but less than 16	14	3	15	100
Total		20		

a. **(2 pts)** Complete the table above.

b. **(4 pts)** Plot a percentage histogram.



c. **(4 pts)** Find the approximate mean of absence.

$$\bar{x} = \frac{\sum m_i f_i}{n-1} = \frac{156}{20} = 7.8$$

7.8

2. Consider the following data set for the part below.

11, 8, 7, 15, 9, 8, 20, 10 ≈ 7, 8, 8, 9, 10, 11, 15, 20

a) (2 pts) Compute the range and the mode.

Rge: 20 − 7 = 13

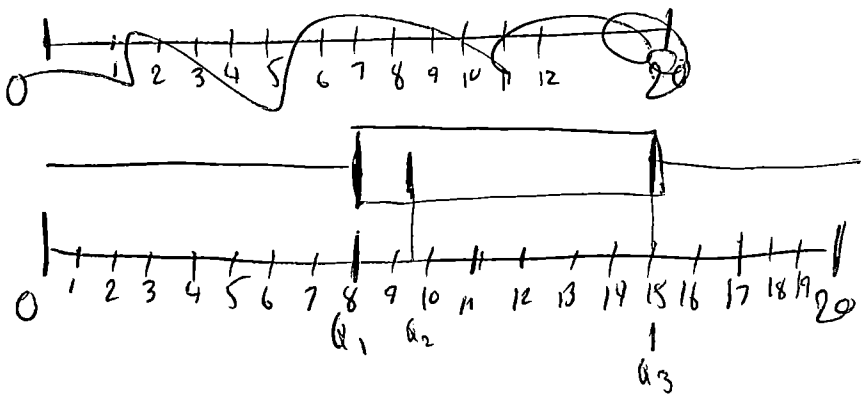
Mode: 8

b) (5 pts) Draw a box-plot displaying five number summary and **comment** on the shape of the distribution of the data.

$Q_1 = \frac{n+1}{4} = \frac{9}{4} = 2.25 = 2 = 8$

$Q_2 = \frac{n+1}{2} = 4.5 = \frac{9+10}{2} = 9.5$

$Q_3 = \frac{3(n+1)}{4} = \frac{3(8+1)}{4} = \frac{3(9)}{9} = 6.75 = 7 = 15$



c) (2 pts) If the mean of the data is 11 and the standard deviation of the data is 4.4, conclude whether 26 is an outlier or not?

$z = \frac{26 - 11}{4.4}$

$= 3.409$

= yes it is because it is greater than 3.0

3. The following observations are given for two variables X and Y.

X	3	8	9	12
Y	14	11	10	5

a) **(4 pts)** Find the covariance between X and Y.

b) **(4 pts)** Find the correlation between X and Y. **Comment** about the linear relationship between X and Y.

4. A survey has been conducted among 500 customers of a fast-food shop about their preferred burger (Beef, Chicken, Cheese). The results are given in the following incomplete table. First, complete the table.

	Beef	Chicken	Cheese	**Total**
Male	75	65	70	210
Female	40	90	160	290
Total	115	185	230	500

a. **(2 pts)** What is the probability that a randomly selected customer is male?

$$\frac{210}{500}$$

b. **(2 pts)** What is the probability that a randomly selected customer does not like chicken burger?

$$\frac{315}{500}$$

c. **(3 pts)** What is the probability that a randomly selected customer is a male or likes beef burger?

$$\frac{75}{115}$$

d. **(3 pts)** Given that a selected customer is male, what is the probability that he likes cheese burger?

$$\frac{70}{210}$$

5. The probability distribution is given below for the number of kids (X) per family in a certain city.

X	$P(X)$
0	0.10
1	0.20
2	0.30
3	0.40

a. **(2 pts)** Find $P(X>1)$

b. **(4 pts)** Find the expected value of X, $E(X)$.

c. **(4 pts)** Find the standard deviation of X.

6. **(6 pts)** You are planning to register in 5 courses next semester. You need to choose 2 elective courses and 3 major courses. If there are 6 electives and 7 major courses, in how many different ways can you register?

7. In a placement test, 80 percent of the math students pass the exam. 12 students are randomly selected. Assume a binomial probability distribution model.

a. (3 pts) What is the probability that exactly seven students pass the exam?

b. (4 pts) What is the probability that at least ten students pass the exam?

c. (2 pts) Compute the mean and the standard deviation of the number of students who pass the exam.

8. A life insurance company in Kuwait has determined that each week an average of four claims is filed. Assume a poisson probability distribution model to answer the following questions.

a. **(3 pts)** What is the probability that during the next week exactly three claims will be filed?

b. **(3 pts)** What is the probability that during the next two weeks exactly seven claims will be filed?

c. **(3 pts)** What is the probability that during the next week at least two claims will be filed?

9. The length of time it takes to drive a trip from Ahmadi to Kuwait City during the week is uniformly distributed between 40 and 60 minutes.

a. (3 pts) What is the probability that a random trip will take at most 45 minutes?

b. (3 pts) What is the probability that a random trip will take between 30 and 42 minutes?

c. (3 pts) What is the probability that a random trip will take 55 minutes?

10. The amount of calcium in one bottle of milk is normally distributed with a mean of 5 grams and a variance of 16.

a. **(3 pts)** What is the probability that a randomly selected bottle will contain between 3 grams and 8 grams of calcium?

b. **(3 pts)** What is the probability that a randomly selected bottle will contain more than seven grams of calcium?

c. **(4 pts)** If X is the amount of calcium in a bottle, find k such that $P(X > k) = 0.8485$?

11. The weight of a green apple is normally distributed with a mean of 150 grams and a standard deviation of 20 grams. 25 apples are selected randomly.

a. (5 pts) What is the probability that the sample mean is between 140 and 150 grams?

b. (5 pts) What is the probability that the sample mean is at least 160 grams?