Prince Sultan University

Department of Mathematical Sciences

Final Exam

Semester II, 2015B Spring (Term 142)
May 23 , 2015

MATH 101 – Finite Mathematics

Time Allowed : 2 hours
Maximum Points: 80 points

Name of the student:			
ID number :			
Section :	**220**	**222**	**221**
Instructor :	**Dr. Kamal Abodayeh**	**Ar. Ahmed Kaffel**	**Mr. Khaled Naseralla**

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 14 problems, some with several parts and a total of 6 pages. Make sure your paper has all these problems.

Question	Maximum score	Your Score
Q.1	10	
Q.2, Q.3, Q.4, Q.5	18	
Q.6, Q.7	12	
Q.8, Q.9, Q.10, Q.11	22	
Q.12, Q.13, Q.14	18	
Total	**80**	

40

Q.1B (10 points): Circle the correct answer.

1) If E and F are mutually exclusive events, then $P(E\ F) =$
(a) $P(E)$ (b) 0 (c) $P(E).P(F)$ (d) $P(F)$

2) If the odds for rain today are 1 to 3, what is the probability of rain today?
(a) 0.75 (b) 0.25 (c) 0.33 (d) 0.5

3) How many nine-letter words can be formed from the letters of the word "**Classroom**"?
(a) $387,420,489$ (b) $3,024$ (c) $362,880$ (d) $90,720$

4) If $\$20,000$ is borrowed for 6 months and $\$600$ is paid, what is the simple interest rate?
(a) 1.2% (b) 0.6% (c) 7.8% (d) 6%

5) Which of the following is **not** necessarily true for independent events A and B?

(a) $P(A|B) = P(A)$ (b) $P(B|A) = P(B)$ (c) $P(A \cup B) = P(A) + P(B)$ (d) $P(A \cap B) = P(A).P(B)$

6) There are 6 people up for 4 different awards. In how many ways can the awards be given if a person cannot receive more than one award?
(a) P(6 , 4) (b) 6! 4! (c) 24 (d) C(6 , 4)

7) A package contains 100 fuses, of which 10 are defective. A sample of 5 fuses is selected at random. How many samples contain exactly 2 defective fuses?
(a) $C(90,3)\,.\,C(10,2)$ (b) $\frac{P(100,5)}{2!3!}$ (c) $C(5,2)\,.\,100^2$ (d) $C(100,3)\,.\,C(10,2)$

8) A television network has 5 hour time slots to fill. If there are 10 shows to choose from, how many different lineups are possible?
(a) $P(10,5)$ (b) $10+5$ (c) $(10)\cdot(5)$ (d) $C(10,5)$

9) What is the number of outcomes of the sample space of tossing 2 dice and a coin?
(a) 24 (b) 14 (c) 72 (d) 128

10) A large basket of fruit contains 3 oranges, 2 apples and 5 bananas. If one fruit is chosen at random, what is the probability of getting an orange or a banana?
(a) $\frac{1}{2}$ (b) $\frac{4}{5}$ (c) $\frac{7}{10}$ (d) None of the above

Q.2 (5 points) The average (SAT) scores of incoming freshmen at a college have been declining at a constant rate in recent years. In 2005 the average (SAT) score was 592, while in 2009 the average (SAT) score was 564.

a) Write an equation that will give the average (SAT) score at any time.

b) If the trend continues, what will the average (SAT) score of the incoming Freshmen be in 2015.

Q.3 (5 points) (a) Find the market price for the supply and demand equations: $\begin{cases} S = 32p + 700 \\ D = 1,720 - 36p \end{cases}$

Where p is the price per unit in dollars.

(b) Find the break-even point for the cost C of production and the revenue R.

$C = 29x + 615$; $R = 34x$

Q.4 (4 points) How much should be deposited in an account every month at 8% compounded quarterly if an amount of 80,000 SR is needed after 10 years?

Q.5 (4 points): Mohammed invested an amount of money 9 years ago in an account that pays 6.5% per year compounded quarterly. His investment is now worth $\$20,000$. How much did he originally invest?

Q.6 (8 points) Use the simplex method to solve the following linear programming problem:

Maximize $P = 3x_1 + 7x_2$ subject to the constraints:

$$2x_1 + x_2 \le 16$$
$$x_1 + x_2 \ge 6$$
$$x_1 \ge 0, x_2 \ge 0$$

Q.7 (4 points) A test consists of 8 True-False questions and 12 Multiple-Choice questions.

(a) In how many ways can a student select 6 True-False questions and 4 Multiple-Choice questions to answer?

(b) In how many ways can a student select 10 questions, at least 8 of which are Multiple-Choice questions?

Q.8 (5 points): A college survey was taken to determine where students study. Of 125 students surveyed, 68 studied in the cafeteria, 62 studied in the student lounge, 22 studied in both the Cafeteria and the student lounge.

a) Draw a Venn diagram showing the data.

b) How many students study only in the cafeteria?

c) If a student is selected at random, what is the probability that he studies neither in the cafeteria nor in the student lounge?

Q.9 (6 points) Department A has 15 people and department B has 20. A committee consisting of 4 people is to be selected out of the two departments. In how many ways can the committee be formed if it has:

(a) 3 people from department A and 1 from B

(b) at least 3 from department B

(c) 4 people regardless of the department

Q.10 (7 points) Use the following probability table to obtain probabilities for events in a sample space.

	E	F	G	
H	0.10	0.06	0.08	
I	0.30	0.14	0.32	

(a) $P(\overline{E}) =$

(b) $P(E \cap H) =$

(c) $P(E \cup I) =$

(d) $P(I \mid \text{G}) =$

(e) Are events E and I independent? Explain tour answer.

Q. 11 (4 points) If E and F are events in a sample space for which $P(E) = 0.3$, $P(F) = 0.4$, and $P(E \cup F) = 0.6$

(a) Find $P(E \mid \overline{F})$

(b) Are E and F independent? Explain your answer.

Q.12 (6 points) Eight hundred shoppers at a local shopping mall were categorized by age and gender as shown in the table below. One shopper is selected at random from that group of 800 shoppers.

	Under 25 year A	25 --- 40 years B	Over 40 years C	
Male, M	75	125	50	
Female, F	125	250	175	

(a) What is the probability that the randomly selected shopper is **Under 25 years** of age?

(b) What is the probability that the randomly selected shopper is **Male or Over 40 years**?

(c) What is the probability that the randomly selected shopper is **Female given that she is 25 --- 40 years** of age?

(d) What is the probability that the randomly selected shopper is **Female and Under 25 years** of age?

Q.13 (6 points) Suppose that 5 cars are defective in a production run of 40 cars. A sample of 4 is to be selected to be checked for defects.

(a) How many different samples can be chosen?

(b) How many samples will contain exactly one defective car?

(c) What is the probability that a randomly chosen sample will contain exactly 2 defective cars?

(d) Find the probability that randomly chosen sample will contain at least one defective car.

Q.14 (6 points) A fair coin is tossed 6 times.

(a) Find the probability that no tail appears.

(b) Find the probability that exactly 2 heads appear.

(c) Find the probability that at least 2 tails appear.