Prince Sultan University

Department of Mathematical Sciences

Major II Exam

Semester II, 2015A SPRING (142)

April 27, 2015

MATH 101 – Finite Mathematics

Time Allowed : 90 minutes
Maximum Points: 80 points

Name of the student:_____

ID number :_____

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Section 220	Section 222	Section 221
9 ----- 10	11 ----- 12	8 ----- 9

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 15 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	15	
Q.2 , Q.3 , Q.4 , Q.5	17	
Q.6 , Q.7 , Q.8 , Q.9 Q.10	22	
Q.11 , Q.12 , Q.13 , Q.14	17	
Q.15	9	
Total	**80**	

20

Q.1 (15 points)A **Circle the correct answer.**

1) Ahmad has 8 shirts and 4 pairs of pants. How many different outfits can he wear?
(a) 12 (b) 32 (c) 80 (d) 2

2) How many 4-letter words can be made using the first 7 letters of the alphabet?
(Repeated letters are allowed)
(a) P(7, 4) (b) C(7, 4) (c) 4^7 (d) 7^4

3) How many license plates consisting of two letters followed by four digits are possible?
(use the English alphabet with repetition of letters and numbers allowed)
(a) $\frac{26^2 10^4}{2!4!}$ (b) $26^2 10^4$ (c) $C(26,2)\,.\,C(10,4)$ (d) $P(26,2)\,.\,P(10,4)$

4) There are 12 horses in a horseshow competition. The top three winning horses receive money. How many possible money winning orders are there for a competition with 12 horses?
(a) C(12, 3) (b) 3×12 (c) P(12, 3) (d) 12^3

5) Suppose you find 8 articles related to the topic of your research paper. In how many ways can you choose 5 articles to read?
(a) 6720 (b) 56 (c) 40 (d) 336

6) A classroom has 20 chairs and 12 students. If the student chooses to sit wherever he wants. In how many ways can this be done?
(a) $C(20,12)$ (b) $P(20,12)$ (c) $\frac{20!}{12!}$ (d) 240

7) The solution of the standard minimum problem that has been solved by the *Duality Principle* and has the following final tableau is:

P	y_1	y_2	y_3	s_1	s_2	RHS
0	1	1	1	1	0	2
0	−1	1	0	−1	1	3
1	4	1	0	5	0	15

(a) $C_{\min.} = 15$, $x_1 = 2$, $x_2 = 3$ (b) $C_{\min.} = 15$, $x_1 = 0$, $x_2 = 5$

(c) $C_{\min.} = 15$, $x_1 = 5$, $x_2 = 0$ (d) $C_{\min.} = -15$, $x_1 = 5$, $x_2 = 0$

8) Find the approximate number of years needed for any amount of money to quadruple (become four times) if the money is invested at a rate of 5% compounded continuously.
(a) 28 years (b) 20 years (c) 30 years (d) 25 years

9) The Saudi football league has 14 teams. Every team plays every other team twice (home and away). How many matches will be played by the end of the season?
(a) 91 (b) 112 (c) 56 (d) 182

10) In how many possible ways can 10 True- False questions be answered?
(a) 20 (b) 1,024 (c) 100 (d) 12

Q.2 (3 points) Sam deposits $\$500$ at the end of every 3 months for period of 7 years in a bank that pays 8% interest compounded quarterly.

a) What is the total amount in his account?

Q.3 (4 points) A bank pays interest of 7% compounded semiannually. If an investment is placed in a saving account and $45,000$ SR were in the account after 8 years, how much was the initial investment?

Q.4 (4 points) If $25,000$ SR are invested in an account that earns 6% simple interest per year. How much is in the account after 30 months?

Q.5 (6 points) A company has 9 senior and 6 junior officers. A committee is to be formed. In how many ways can a committee of 4 officers be formed so that it is composed of:

a) Any 4 officers?

b) At least 3 senior officers?

Q.6 (4 points) Given that $n(A)=40$, $n(B)=60$, $n(A\cup B)=80$, and $n(U)=100$ determine the number of elements in each of the following:

a) $n(A\cap \overline{B})=$

b) $n(\overline{A}\cup \overline{B})=$

Q.7 (4 points) Suppose that all of the 250 first year students at CBA college are enrolled in a Math 101 or in an English 101 course. Suppose that 110 are taking both Math and English courses. Also suppose that 160 are taking English course. Use Venn Diagram to find how many students are taking Math 101 course?

Q.8 (8 points) Use the binomial theorem to:

a) determine **the last three terms** in the expansion: $(x+y)^{10}$

b) find the coefficient of x^{10} in the expansion: $(2x^2-5)^8$

c) How many subsets of the set $\{1,-1,3,5,7,8\}$ are there?

Q.9 (3 points) In how many ways can 5 people each have different birthday? Assume there are 365 days in the year.

Q.10 (3 points) There are 12 standbys who hope to get on a flight to Jeddah, but only 6 seats are available on the plane. How many different ways can the 6 people be selected?

Q.11 (3 points) A person purchasing a new car has several options: 5 interior color choices, 7 exterior color choices, 3 choices of radios, and 4 choices of body styles. How many different cars are possible if one choice is made for each option?

Q.12 (4 points) Each employee at a IBM company is to be issued a computer ID code that consists of **two** letters followed by **three** digits.

a) How many ID codes are possible if repetition is allowed?

b) How many ID codes are possible if letters are not repeated, but digits may repeat?

Q.13 (4 points) Telephone numbers consist of 7 digits using the numbers between 0 and 9. How many telephone numbers can be made if the telephone number cannot start with a zero and the last digit must be odd? (Repeated digits is allowed)

Q.14 (6 points): Write the **Dual Problem** for the following linear programming problem. **Don't solve it**

Minimize $C = 5x_1 + 4x_2$ subject to the constraints

$$10x_1 + 6x_2 \geq 900$$

$$4x_1 + 9x_2 \geq 95$$

$$x_1 \geq 0 \text{ and } x_2 \geq 0$$

Q.15 (9 points): Use **the Simplex Method** to solve the Linear Programming Problem

Maximize $P = 2x_1 + 3x_2$ subject to the constraints

$x_1 + x_2 \leq 8$

$2x_1 + x_2 \geq 10$

$x_1 + x_2 \geq 4$

$x_1 \geq 0$, $x_2 \geq 0$