Prince Sultan University
Deanship of Educational Services
Department of Mathematics and General Sciences

COURSE DETAILS:

FINITE MATHEMATICS	MATH 101	FINAL EXAM
Semester:	Term 182	
Date:	Saturday April 20, 2019	
Time Allowed:	3 hours	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	
Instructor's Name:	

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Page 4	Page 5	Total	Total
Questions							
Marks	**17**	**17**	**10**	**19**	**17**	**80**	**40**

Q1. [6 points] Let $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. Show that $A^2 - 2I_3 = A$.

Q2. [6 points] The supply and demand equations for sugar have been estimated to be given by the equations

$$S = 0.7p + 0.4, \quad D = -0.5p + 1.6,$$

where p is the price in dollars per pound and S and D are in millions of Kgs.

(a) Find the market price.

(b) What quantity of supply is demanded at this market price?

(c) Graph both the supply and demand equations.

Q3. [5 points] The owner of a restaurant needs to borrow $12,000 from a bank to buy some equipment. The bank will give the owner a discounted loan at an 11% rate of interest for 9 months. What loan amount should be used so that the owner will receive $12,000?

Q4. [8 points] Solve the system **using matrices**

$$\begin{aligned} 2x - 5y + z &= 3 \\ x - 3y - 2z &= -1 \\ 4x - 11y - 3z &= 1 \end{aligned}$$

Q5. [9 points] **Use graph** to find the maximum value of the function

$$P = 10x + 15y$$

Subject to

$$\begin{aligned} x + 4y &\leq 360 \\ 2x + y &\leq 300 \\ x \geq 0, y &\geq 0 \end{aligned}$$

Q6. [10 points] **Use Simplex method** to solve the linear programming problem:
Maximize $z = 4x_1 + x_2$ subject to

$$3x_1 + x_2 \leq 180$$
$$x_1 + 2x_2 \leq 100$$
$$-2x_1 + 2x_2 \leq 40$$
$$x_1 \geq 0, \qquad x_2 \geq 0$$

Q7. [4 points] Todd and Tami pay $300 every 3 months for 6 years into an ordinary annuity paying 4% compounded quarterly. What is the value of the annuity at the end of the investment?

Q8. [3 points] How many different 9-letter words (real or imaginary) can be formed from the letters in the word "ECONOMICS"?

Q9. [6 points] Use the table to obtain probabilities for events in a sample space S.

	E	F	G
H	0.1	.06	.08
I	0.3	0.14	0.32

Find the following probabilities

(a) $P(E) =$

(b) $P(E|I) =$

(c) $P(H|\overline{F}) =$

Q10. [6 points] Two people are selected at random from a group of 12 CBA students and 10 CCIS Students. Find the probability that

a) Both are CBA students.

b) Exactly one CBA student.

c) At least one CCIS student.

Q11. [8 points] A survey of couples in a certain country found the following:
The probability that the husband has a college degree is 0.65
The probability that the wife has a college degree is 0.70.
The probability that both have a college degree is 0.50.

a) Find the probability that at least one has a college degree.

b) Find the probability that the wife has a college degree and the husband does not.

c) Find the probability that the wife has a college degree given that the husband does not.

Q12. [4 points] Suppose that $P(E) = 0.2,\ P(F) = 0.5$ and E, F are independent events. Find the following:

(a) $P(E \cap F) =$

(b) $P(E \cup F) =$

Q13. [5 points] A box contains 5 red balls, 6 green balls and 2 white balls. Three balls are drawn without replacing the others. Find the probability that the first is red, the second is green and the third is white.