PRINCE SULTAN UNIVERSITY

MATH 101 FINITE MATHS

MAJOR EXAM 2

Start: 4:00 pm

End: 5:30 pm

Name _____

I.D. _____

Section: Circle one (108) (109) (110)

1. Answer all questions
2. This exam consists of 4 pages, 8 questions
3. You can use a calculator, NOT a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1, 2	**17**	
3, 4, 5	**21**	
6, 7, 8	**22**	
TOTAL		

Q 1: (13 Points) Use simplex Method to solve the Linear Programing Problem

Maximize $P = 2x_1 + x_2 + 3x_3$

subject to the constraints
$$x_1 + 2x_2 + x_3 \leq 25$$
$$3x_1 + 2x_2 + 3x_3 \leq 30$$
$$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

Q 2: (4 Points) The tableau below represents a **minimum linear programming** in a standard form. Find the min value and where it occurs.

BV	P	y_1	y_2	y_3	s_1	s_2	s_3	RHS
	0	0	1	$\frac{1}{2}$	$\frac{2}{5}$	0	$-\frac{1}{10}$	$\frac{3}{10}$
	0	0	0	-3	-1	1	1	2
	0	1	0	$-\frac{1}{2}$	$-\frac{1}{5}$	0	$\frac{3}{10}$	$\frac{1}{10}$
	1	0	0	7	$\frac{8}{5}$	0	$\frac{13}{5}$	$\frac{21}{5}$

Q3.(6 Points) Use the **Duality** to convert the problem into a maximum **(Don't attempt solving it)**

Minimize $z = 5x_1 + 3x_2 + x_3$

Subject to the constraints
$$x_1 - 3x_2 \geq 5$$
$$2x_1 + x_2 - x_3 \geq 1$$
$$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$$

.

Q4. (8 Points) John will need $40,000 for a down payment on a house in 4 years.

a. How much should he deposit in a savings account now so that they will be able to do this? The bank pays 3% compounded quarterly.

b. What is the effective rate?

Q5. (7 Points) Sarah Jane needs to borrow $40,000 to repair her house. She can get a discounted loan from her bank at a 9% rate of interest for 20 months. What loan amount should be used so that she will receive the $40,000 she needs?

Q6. (7 Points) In 4 years Colleen and Bill would like to have $35,000 for a down payment on a house. How much should they deposit each month into an account paying 4% compounded monthly to have $30,000 after that?

Q7. (6 Points) The number of students at PSU using different types of mobiles, is given in the table below

	IPhone	Samsung	Huawei	Other devices
PYP Students	125	130	72	93
Junior Students	90	95	80	29
Senior Students	88	94	65	85

a) What is the number of mobiles used by PYP students?

b) What is the number of mobiles used by Junior students or of Huawei type?

c) What is the number of mobiles used by Senior or PYP students but not an IPhone type?

d) What is the total of mobiles used by PSU students?

Q8. (9 Points) From 7 CBA students, 6 PYP students, and 8 Engineering students a student club committee of 5 is to be formed.

a) If the committee must include 2 CBA students and 3 Engineering students, in how many ways can this be done?

b) If the committee must include 2 CBA Students, 2 Engineering Students and 1 PYP student, in how many ways can this be done?

c) If the committee must include at least 3 CBA Students, in how many ways can this be done?

Q10: From a box containing 5 red balls and 7 green balls, three balls are selected without replacing the others. In how many ways can we select 2 red balls and one green ball?

Q 11: How many different 9-letter words (real or imaginary) can be formed from the letters in the word ECONOMICS?