KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
Department of Mathematics & Statistics

FIRST EXAM for **MATH 131**, 2011–2012 (112)
Instructor: Stefanos Orfanos

Student ID: Name: Section:

1.	5.	9.
2.	6.	10.
3.	7.	*Total:*
4.	8.	

Time given: 120 minutes.

This exam has 10 questions, all worth 10 points.

All work must be shown. Answers with no work receive no points. Points will be deducted for unreadable writing or wrong steps.

All mobile phones should be turned off during the exam.

Calculators are allowed.

Problem 1

A company manufactures products A and B. The cost of producing each unit of A is SR 2 more than that of B. The costs of production of A and B are SR 1500 and SR 1000, respectively, and 25 more units of A are produced than of B. How many of each are produced?

Problem 2

The CEO of a company decides to take out a short-term loan to be used to pay bonuses to its employees. The company has current assets SR 120,000 and current liabilities SR 75,000. How much can the company borrow if the current ratio is to be no less than 1.5?

Problem 3

Solve the nonlinear system:

$$\begin{cases} x = y + 1 \\ y = 2\sqrt{x - 2} \end{cases}$$

Problem 4

A coffee seller blends together 3 types of coffee that sell for SR 5, SR 7 and SR 10 per pound, so as to obtain 10 lbs of coffee worth SR 77. If he uses equal amounts of the 2 lower-priced coffees, how much of each type does he use in the blend?

Problem 5

Assume that the supply and demand functions of a product are $p = 2\sqrt{q} - 5$ and $p = 7 - \sqrt{q}$, respectively.

(a) Find the equilibrium price and quantity.

(b) If a tax of 25% is added on the sale price of the product, find the new equilibrium price.

Problem 6

The demand function for a manufacturer's product is $p = f(q) = 120 - 3q$, where p is the price (in SR) per unit when q units are demanded (per day). Find the level of production that maximizes the manufacturer's total revenue and determine this revenue.

Problem 7

Solve the system of inequalities:

$$\begin{cases} 2x - 3y < -6 \\ y < x \\ 3x + y < -3 \end{cases}$$

Problem 8

A company produces two kinds of can openers: manual and electric. Each requires in its manufacture the use of three machines: A, B, and C. The production of each manual can opener requires the use of A for 2 h, B for 1 h, and C for 1 h. An electric can opener requires 1 h on A, 2 h on B, and 1 h on C. Furthermore, suppose the maximum numbers of hours available per month for the use of machines A, B, and C are 160, 180, and 100, respectively.

(a) Write down the constraints and carefully graph the feasible region.

(b) If the profit from selling each manual can opener is SR 4, and from each electric can opener is SR 6, and the company sells all the can openers it produces, how many of each type should it make to maximize profit?

Problem 9

Find the points (x, y) where the linear function $Z = 3x + 2y$ assumes its maximum value, subject to the constraints:

(a)

$$\begin{cases} x \leq y \\ x + y \geq 0 \\ y \leq 3 \end{cases}$$

(b)

$$\begin{cases} x \geq y \\ 3x < 18 - 2y \\ y \geq 3 \end{cases}$$

Problem 10

A car dealer has showrooms in Khobar and in Riyadh and warehouses in Dammam and Al-Hasa. The cost of delivering a car is SR 6 from Dammam to Khobar, SR 40 from Dammam to Riyadh, SR 18 from Al-Hasa to Khobar and SR 65 from Al-Hasa to Riyadh. Suppose that the showroom in Khobar needs 7 cars and the one in Riyadh 4 cars. If the warehouse in Dammam has 8 cars available, and the one in Al-Hasa 6 cars, find the minimum cost.