King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

Math 131 (Term 133)

Exam 1

4:00 – 5:40 p.m. (Duration: 100 minutes)

Student Name_____ **Student ID:** _____

Question	Score
1	\10
2	\15
3	\15
4	\15
5	\15
6	\15
7	\15
Total Score	\100

Exercise 1 (10 points)

Find an equation of the line passing through $(4, -5)$ and perpendicular to the line $3y = \frac{-2}{5}x + 3$.

Exercise 2 (15 points)

A manufacturer sells a product at 8.35 SR per unit, selling all produced. The fixed cost is 2,116 SR and the variable cost is 7.20 SR per unit. Find the break-even quantity.

Exercise 3 (15 points)

The demand function for an office company's line of plastic rulers is $p = 0.81 - 0.00045q$, where p is the price (in Riyals) per unit when q units are demanded (per day) by consumers. Find the level of production that will maximize the revenue and find this maximum revenue.

Exercise 4 (15 points)

A chemical manufacturer wishes to fill an order for 800 litters of a 25% acid solution. Solutions of 20% and 35% are in stock. How many litters of each solution must be mixed to fill the order?

Exercise 5 (15 points)

Find the break-even quantities for a company which sells all it produces, if the variable cost per unit is 3 SR, the fixed costs are 2 SR, and the total revenue is given by $R = 5\sqrt{q}$ where q is the number of thousands of units produced.

Exercise 6 (15 points)

A firm produces three products **A**, **B**, and **C** that require processing by three machines **I**, **II**, and **III**. The time in hours required for processing one unit of each product is given by the following table:

	A	**B**	**C**
Machine I	4	2	1
Machine II	2	1	1
Machine III	3	1	3

Machine **I** is available for **380** hours, Machine **II** is available **210** hours, and Machine **III** is available for **350** hours. Find how many units of each product should be produced to make use of all the available time on the machines. Use matrix reduction method only.

Let

x =

y =

z =

System:

……=……

……=……

……=……

Augmented Matrix:

Reduced Matrix: (Show your work on the back of this page)

Solution:

x =

y =

z =

Exercise 7 (15 points)

Use the geometric approach to maximize $\boldsymbol{Z = y - x}$ subject to $\begin{cases} \boldsymbol{x \geq 2} \\ \boldsymbol{x + 2y \geq 3} \\ \boldsymbol{x - 3y \geq -3} \\ \boldsymbol{y \geq 0} \end{cases}$