King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 105 (181) Major Exam 1

Name:.....ID:.....

Exercise 1 *(12 pts) The demand function for a manufacturer's product is $p = 150 - 3q$, where p is the price (in SR) per unit when q units are demanded (per day). Find the maximum revenue that the manufacturer can receive.*

Exercise 2 *(12 pts) A manufacturer will break even at a total revenue of $110,000$ SR. Fixed costs are $20,000$ SR and each unit of output sells for 15 SR. Determine the variable cost per unit.*

Exercise 3 *(12 pts) Solve the linear system*

$$\begin{cases} 2x + y - z = 1 \\ 2x - y + 3z = -2 \\ x + y + 2z = 3 \end{cases}$$

Exercise 4 *(14 pts) Solve the system of inequalities*

$$\begin{cases} x + 2y \leq 12 \\ x - y \leq 3 \\ x \geq 0, y \geq 1 \end{cases}$$

Exercise 5 *(12 pts) A total of $\$20,000$ was invested in two businesses A and B. At the end of the first year, A and B returns 8% and 3% respectively, on the original investment. How was the original amount allocated if the total amount earned was $\$800$.*

Exercise 6 *(12 pts) The demand equation for a certain product is given by $p = 100 - 0.02x$, where p is the unit price (in dollars) of the product and x is the number of units produced. Determine price(s) that would yield a revenue of 5120 dollars.*

Exercise 7 *(13 pts) Let $p = \frac{8}{50}q + 50$ be the supply equation for a manufacturer's product and suppose the demand equation is $p = -\frac{7}{50}q + 65$.*

(a) If a tax of $\$1.50$ per unit is to be imposed on the manufacturer, how will the original equilibrium price be affected if the demand remains the same?

(b) Determine the total revenue obtained be the manufacturer at the equilibrium point for both before and after the tax.

Exercise 8 *(13 pts) A mobile manufacturer is planning to sell its new mobile phone to a retailer. The cost to the retailer will be SR2000. As a convenience to the retailer, the manufacturer will attach a price tag each mobile phone. What amount should be marked on the price tag so that the retailer can reduce this price by 20% during a sale and still make a profit of 50% on the cost?*