

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

MATH 131 // Major Exam I
(121)
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ID: Name:..... Section:....

Exercise #1: A company makes a product for which the variable cost per unit is SR24 and fixed cost SR30000. Each unit has a selling price of SR71. Determine the number of units that must be sold for the company to make a profit of SR211016.

Exercise #2: A company is planning to sell its new product to retailers. The cost to the retailer will be SR85 per unit. As a convenience to the retailer, the company will attach a price tag so that the retailer may reduce this price by 15% during a sale and still makes a profit of 20% on the cost. What will be that price tag ?

Exercise #3: For a company that manufactures a certain product the combined costs for labor and material is SR35 per unit. Fixed costs are SR65000. If the selling price of one unit is SR71, how many must be sold for the company to earn a profit higher than SR117196 ?

Exercise #4: For which values of m the lines $y = mx + 1$ and $y = (2 - m)x + 3$ are
(1) parallel
(2) perpendicular

Exercise #5: For which values of a, b and c the parabola $y = ax^2 + bx + c$, ($a \neq 0$), will have a vertex at $(2, 3)$ and passes through the point $(5, -1)$? Find an interval over which the new function has an inverse, then plot both, the new function and its inverse on the same axes (scale).

Exercise #6: The demand function for a manufacturer's product is $p = 66 - 3q$, where p is the price (in SR) per unit when q units are demanded (per week) by consumers. Find the level of production that will maximize the manufacturer's total revenue and determine that revenue.

Exercise #7: Solve the nonlinear system

$$\begin{cases} x = y + 2 \\ y = \sqrt{12 - 2x} \end{cases}$$

Exercise #8: Let $p = 4\sqrt{q} - 10$ and $p + 2\sqrt{q} = 14$ be the supply and demand equation respectively.

- (1) Find the equilibrium point.
- (2) If a tax of 20% is added on the sale of the product, find the new equilibrium if the demand remains the same.

Exercise #9: The manager of a company is setting up a production schedule for the new models of a product. Model A requires 5 resistors, 7 transistors and 2 capacitors, Model B requires 3 resistors, 4 transistors and 1 capacitor. He receives from his supplier 236 resistors, 325 transistors and 89 capacitors. How many of each model should the manager plan to make each day so that all resistors, transistors and capacitors are used ?

Exercise #10: If in the previous Exercise we remove the condition that all the components (resistors, transistors and capacitors) should be used, describe the set representing all level of production possible.