

A company manufactures laptop computers. The company has collected data and determined that in order to sell 5000 of these computers, they must set the price at \$1700 per computer, and in order to sell 10,000 of these computers, they must set the price at \$1400 per computer. The company has found that there is often an approximately *linear* relationship between the number of computers that can be sold (that is, the *demand* for the computer) and the *price* that is charged for each computer, and that the relationship is valid for one thousand to 25 thousand computers. This relationship is called a *price - demand function*.

Part I. Finding a Price – Demand Function

1. Let x be the number of computers *in thousands* which will sell at a price y . Write the information given above as two data points of the form (x, y) and then use the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to find the slope of the line containing these points.
2. Now find the equation of this line. Leave your answer solved for y .
3. Replace y by $p(x)$ in your answer to #2 to write your answer as a price-demand function. Since the relationship is valid for one thousand to 25 thousand computers, the domain of the function will be $1 \leq x \leq 25$.
4. Find $p(18)$ and interpret your answer.
5. If the manufacturer sets the price at \$800, what will the demand be?

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Part II. Revenue, Cost and Profit

6. In general, the *revenue* received by a manufacturer if x items are produced and sold is given by

$$\text{Revenue} = (\# \text{ of items}) \cdot (\text{price per item}) = x p(x).$$

Write the revenue function for this situation.

7. Usually, in business, the manufacturer's main concern is profit:

$$\text{Profit} = \text{Revenue} - \text{Cost}; \text{ or in symbols, } P(x) = R(x) - C(x)$$

Suppose the manufacturer has determined that the cost of producing and selling x thousand computers is $C(x) = 4000 + 500x$ thousand dollars. Find and simplify the profit function.

Part III. Homework (based on Exercise Set 1-1/ #79, 81, 83)

A company manufactures memory chips for microcomputers. Its marketing research department has determined that in order to sell 4 million of these chips, the price per chip must be \$63, while in order to sell 10 million of the chips, the price per chip must be set at \$45. The market research department has also determined that the relationship between price and demand is approximately linear, and that the relationship is valid between one million and 20 million chips.

1. Let x be the number of memory chips *in millions* which will sell at a price y .
 - (a) Write the information given above as two data points of the type (x, y) .
 - (b) Find the slope and equation of the line containing these points and write your answer as a price-demand function. What is the domain of the function?
 - (c) What is the price for a demand of 7 million chips?
2. Write the company's revenue function.
3. The financial department for the memory chip manufacturer has established the following cost function for producing and selling x million memory chips:
$$C(x) = 125 + 16x \text{ million dollars.}$$
Find and simplify the profit function for the memory chips.
4. What will the profit be if 10 million memory chips are sold?