

## Quadratic Functions

The marketing research department for a company that manufactures and sells memory chips for microcomputers established the following price-demand and revenue functions:

$$\begin{aligned} p(x) &= 75 - 3x && \text{price-demand function} \\ R(x) &= xp(x) = x(75 - 3x) && \text{Revenue function} \end{aligned}$$

where  $p(x)$  is the wholesale price in dollars at which  $x$  million chips can be sold and  $R(x)$  is in millions of dollars. Both functions have domain  $1 \leq x \leq 20$ .

- (A) Sketch a graph of the revenue function in a rectangular coordinate system
- (B) Find the value of  $x$  that will produce the maximum revenue. What is the maximum revenue?
- (C) What is the wholesale price per chip that produces the maximum revenue?

## Horizontal Asymptotes

Find the equation of any horizontal asymptotes in the following

$$(1) f(x) = \frac{5x^3 + 2x - 3}{6x^3 - 7x + 1}$$

$$(2) f(x) = \frac{1 - 5x + x^2}{2 + 3x + 4x^2}$$

$$(3) f(x) = \frac{3 + 5x}{x^2 + 2x + 3}$$

$$(4) f(x) = \frac{x^2 - 6x + 1}{x - 5}$$

## Vertical Asymptotes

Find the equations of any vertical asymptotes in the following

$$(1) f(x) = \frac{x^2 + 1}{(x^2 - 1)(x^2 - 9)}$$

$$(2) f(x) = \frac{x^2 - x - 6}{x^2 - 3x - 10}$$

$$(3) f(x) = \frac{x^2 + 3x}{x^3 - 36x}$$

## Average Cost

A company manufacturing snowboards has fixed costs of \$200 per day and total costs of \$3,800 per day at a daily output of 20 boards.

- (A) Assuming that the total cost per day,  $C(x)$ , is linearly related to the total output per day,  $x$ , write an equation for the cost function.
- (B) The average cost per board for an output of  $x$  boards is given by  $\bar{C}(x) = C(x)/x$ . Find the average cost function.
- (C) Sketch a graph of the average cost function, including any asymptotes, for  $1 \leq x \leq 30$ .
- (D) What does the average cost per board tend to as production increases?