

College Algebra, Section 6.5, #38  
Rational Functions and Rational Equations

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**Average Cost** The average cost per set for the production of a certain brand of television sets is given by

$$\bar{C}(x) = \frac{1000 + 30x + 0.1x^2}{x}$$

where  $x$  is the number of units produced.<sup>1</sup>

a. What is the average cost per set when 30 sets are produced?

$$\begin{aligned}\bar{C}(x) &= \frac{1000 + 30x + 0.1x^2}{x} \\ \bar{C}(30) &= \frac{1000 + 30(30) + 0.1(30)^2}{30} \\ &= \frac{1000 + 900 + 0.1(900)}{30} \\ &= \frac{1990}{30} \\ &= 66.33333\end{aligned}$$

The average cost per set when 30 sets are produced is \$66.33.

b. What is the average cost per set when 300 sets are produced?

$$\begin{aligned}\bar{C}(x) &= \frac{1000 + 30x + 0.1x^2}{x} \\ \bar{C}(300) &= \frac{1000 + 30(300) + 0.1(300)^2}{300} \\ &= \frac{1000 + 9000 + 0.1(90,000)}{300} \\ &= \frac{19000}{300} \\ &\approx 63.33333\end{aligned}$$

The average cost per set when 300 sets are produced is \$63.33.

c. What happens to the function when  $x = 0$ ? What does this tell you about the average cost when 0 units are produced?

When  $x = 0$  the function is undefined because there is a 0 in the denominator of the fraction. The average cost is also undefined at this point.

From the graph (shown below) we can see that as  $x$  approaches 0 from the left (moving along the graph from left to right), the graph dive down toward  $-\infty$  and as  $x$  approaches 0 from the right (moving along the graph from right to left), the graph increases toward  $+\infty$ . Thus, this function is undefined at  $x = 0$ .

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<sup>1</sup>Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 489, #38.

# College Algebra

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