# Application

Suppose that the revenue $R$, in dollars, from selling $x$ clocks is $R(x) = 30x$. The cost $C$, in dollars, of selling $x$ clocks is $C(x) = 0.1\,x^2 + 7x + 400$.

a. Find the profit function, $P(x) = R(x) - C(x)$

$P(x) = (30x) - (0.1x^2 + 7x + 400)$

$= 30x - 0.1x^2 - 7x - 400$

$P(x) = -0.1x^2 + 23x - 400$

b. Find and interpret $P(30)$.

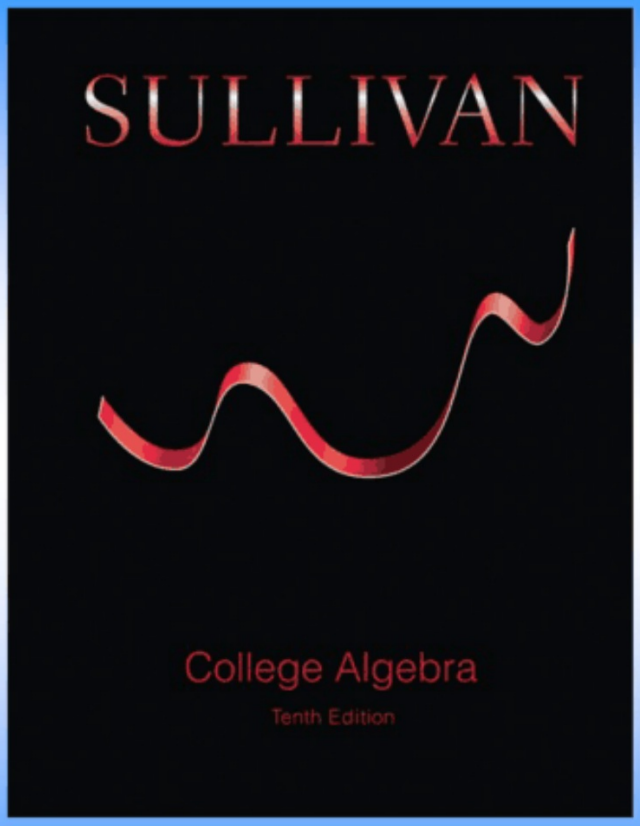
$P(30) = -0.1(30)^2 + 23(30) - 400$

$P(30) = 200$

If we sell 30 clocks, we make $200 in profit.

# Chapter 3

## Section 2



## 3.2 The Graph of a Function

**PREPARING FOR THIS SECTION** *Before getting started, review the following:*

- Graphs of Equations (Section 2.2, pp. 157–159)
- Intercepts (Section 2.2, pp. 159–160)

Now Work the 'Are You Prepared?' problems on page 218.

**OBJECTIVES** 1 Identify the Graph of a Function (p. 214)
2 Obtain Information from or about the Graph of a Function (p. 215)

# Theorem

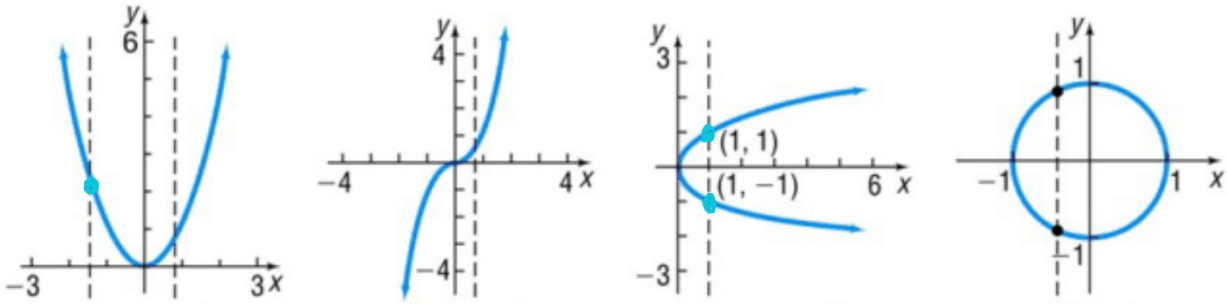
**Vertical-Line Test**

A set of points in the $xy$-plane is the graph of a function if and only if every vertical line intersects the graph in at most one point.

# Example

**Identifying the Graph of a Function**

Which of the graphs in Figure 14 are graphs of functions?




yes yes No No

Figure 14

# Example

## Obtaining Information from the Graph of a Function

Let $f$ be the function whose graph is given in Figure 15. (The graph of $f$ might represent the distance $y$ that the bob of a pendulum is from its *at-rest* position at time $x$. Negative values of $y$ mean that the pendulum is to the left of the at-rest position, and positive values of $y$ mean that the pendulum is to the right of the at-rest position.)

(a) What are $f(0), f\left(\frac{3\pi}{2}\right)$, and $f(3\pi)$?

(b) What is the domain of $f$?

(c) What is the range of $f$?

(d) List the intercepts. (Recall that these are the points, if any, where the graph crosses or touches the coordinate axes.)

(e) How many times does the line $y = 2$ intersect the graph?

(f) For what values of $x$ does $f(x) = -4$?

(g) For what values of $x$ is $f(x) > 0$?

# Figure 15

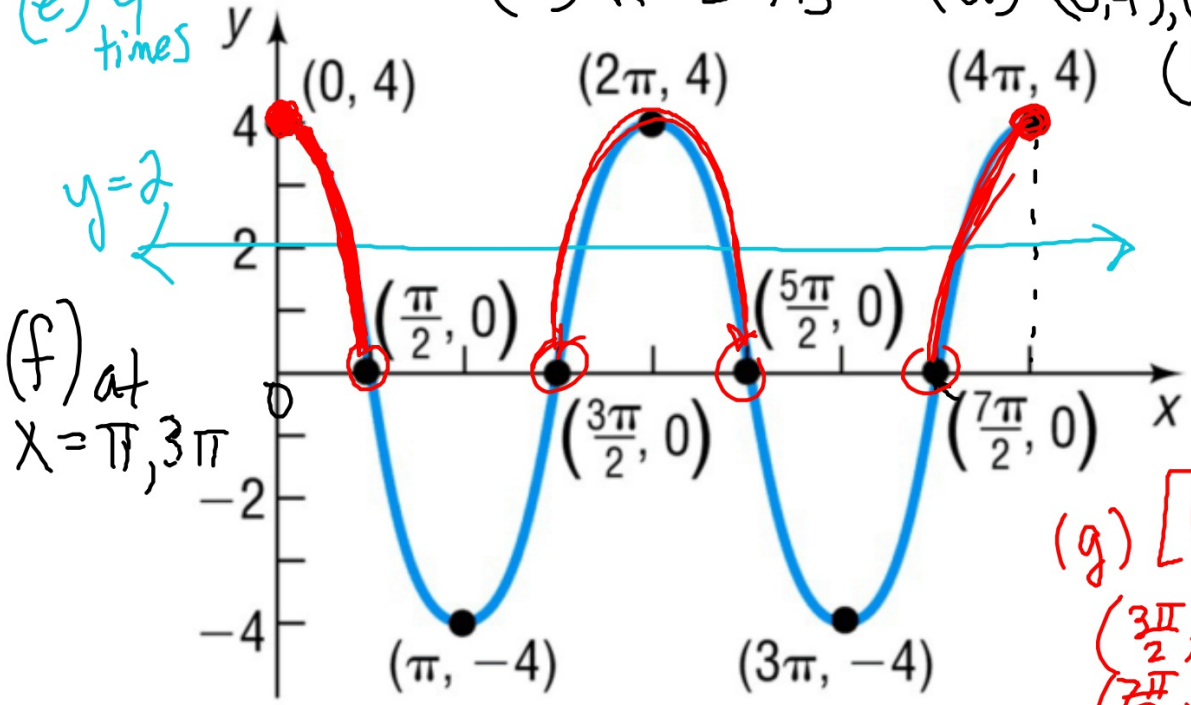
(a) $f(0) = 4$, $f\left(\frac{3\pi}{2}\right) = 0$, $f(3\pi) = -4$

(b) D: $[0, 4\pi]$

(c) R: $[-4, 4]$

(d) $(0,4)$, $\left(\frac{\pi}{2}, 0\right)$, $\left(\frac{3\pi}{2}, 0\right)$, $\left(\frac{5\pi}{2}, 0\right)$, $\left(\frac{7\pi}{2}, 0\right)$

(e) 4 times




(f) at $x = \pi, 3\pi$

(g) $\left[0, \frac{\pi}{2}\right)$, $\left(\frac{3\pi}{2}, \frac{5\pi}{2}\right)$, $\left(\frac{7\pi}{2}, 4\pi\right]$