Q7. Sketch the graph of a linear function with positive y-intercept and negative slope.

Q8. Sketch the graph of a quadratic function opening downward.

Q9. Sketch the graph of a decreasing exponential function.

Q10. At what value(s) of x is $f(x) = (x - 4)/(x - 3)$ undefined?

For Problems 1–4, estimate the definite integral by counting squares on a graph.

1. $f(x) = -0.1x^2 + 7$
   a. $x = 0$ to $x = 5$
   b. $x = -1$ to $x = 6$
2. $f(x) = -0.2x^2 + 8$
   a. $x = 0$ to $x = 3$
   b. $x = -2$ to $x = 5$
3. $h(x) = \sin x$
   a. $x = 0$ to $x = \pi$
   b. $x = 0$ to $x = \pi/2$
4. $g(x) = 2^x + 5$
   a. $x = 1$ to $x = 2$
   b. $x = -1$ to $x = 1$
5. In Figure 1-3j, a car is slowing down from velocity $v = 60$ ft/s. Estimate the distance it travels from time $t = 5$ s to $t = 25$ s by finding the definite integral.

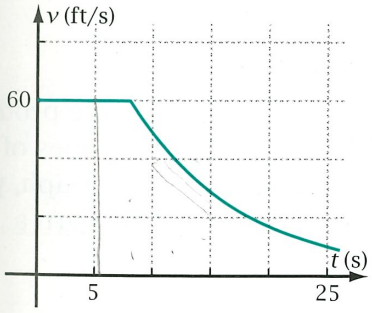

Figure 1-3j

6. In Figure 1-3k, a car slowly speeds up from $v = 55$ mi/h during a long trip. Estimate the distance it travels from time $t = 0$ h to $t = 4$ h by finding the definite integral.

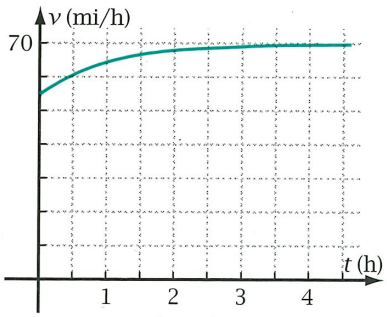

Figure 1-3k

For Problems 7 and 8, estimate the derivative of the function at the given value of x.

7. $f(x) = \tan x$, $x = 1$
8. $h(x) = -7x + 100$, $x = 5$
9. *Electric Car Problem:* You have been hired by an automobile manufacturer to analyze the predicted motion of a new electric car they are building. When accelerated hard from a standing start, the velocity of the car, $v(t)$, in ft/s, is expected to vary exponentially with time, t, in seconds, according to the equation

   $$v(t) = 50(1 - 0.9^t)$$

   a. Plot the graph of function v in the domain $[0, 10]$. What is the corresponding range of the function?
   b. Approximately how many seconds will it take the car to reach a velocity of 30 ft/s?
   c. Approximately how far will the car have traveled when it reaches 30 ft/s? Which of the four concepts of calculus is used to find this distance?
   d. At approximately what rate is the velocity changing when $t = 5$? Which of the four concepts of calculus is used to find this rate? What is the physical meaning of the rate of change of velocity?