Chapter 1 Review

1. **(Lesson 1.1)** Let $S(t)$ be the amount of sales in dollars by a small business during the t-th week after January 1. Suppose sales on January 1 were 8044 dollars and sales 6 weeks later were 5200 dollars. Compute the following over the time interval [0, 6]. Include units in each answer.
   (a) Δt = _____ (b) ΔS = _____ (c) $\frac{\Delta S}{\Delta t}$ = _____
   (d) Use the average rate of change in Part (c) to estimate the sales during the 4^{th} week after January 1. That is, estimate $S(4)$.

2. **(Lesson 1.2)** The graph of a function is given in Figure 1.
   (a) Determine the average rate of change of the function between the indicated points.
   (b) Find a point-slope form $y - y_0 = m(x - x_0)$ of the secant line between the indicated points. Use the left-hand point as (x_0, y_0).
   (c) Find the slope-intercept form $y = mx + b$ of the secant line between the indicated points.

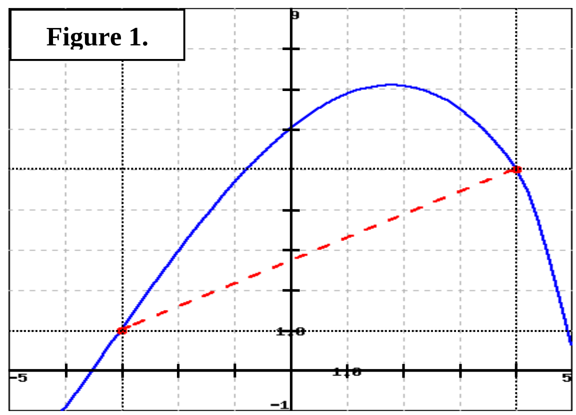
Figure 1.

3. **(Lesson 1.3)** Suppose b is a real constant.
   (a) If $f(x) = b$, then $f'(x) =$ _____.
   (b) If $g(x) = 25$, then $g'(x) =$ _____.
   (c) If $h(x) = -0.13$, then $h'(x) =$ _____.

4. **(Lesson 1.3)** Suppose m and b are real constants.
   (a) If $f(x) = mx + b$, then $f'(x) =$ _____.
   (b) If $g(x) = 8x - 5$, then $g'(x) =$ _____.
   (c) If $h(x) = 44 - x$, then $h'(x) =$ _____.

5. **(Lesson 1.3)** If the position of an object is given by $s(t) = -35t + 8$ ft, then at $t = 3$ seconds,
   (a) the velocity of the object is _____,
   (b) the speed of the object is _____, and
   (c) the acceleration of the object is _____.

6. **(Lesson 1.4)** For each pair of integrals, find the family of antiderivatives, and then use the Fundamental Theorem of Calculus to evaluate the definite integral.
   (a) $\int 12\, dx$ = _____ (b) $\int -3\, dx$ = _____
   $\int_{-1}^{2} 12\, dx$ = _____ $\int_{1}^{5} -3\, dx$ = _____

7. **(Lesson 1.4)** Express the net area of the shaded region in Figure 2 below with a definite integral. Then use the Fundamental Theorem to evaluate it.

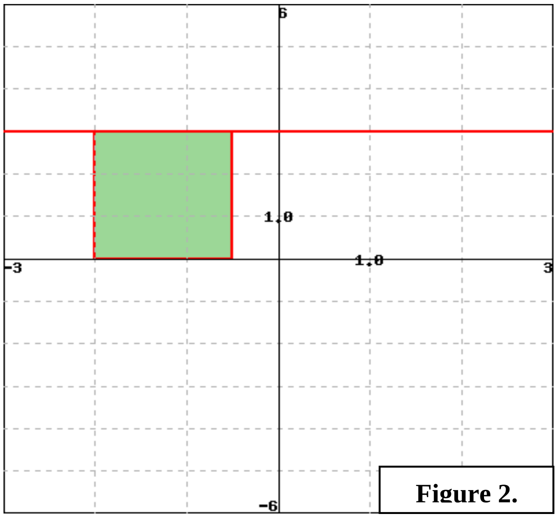

Figure 2.

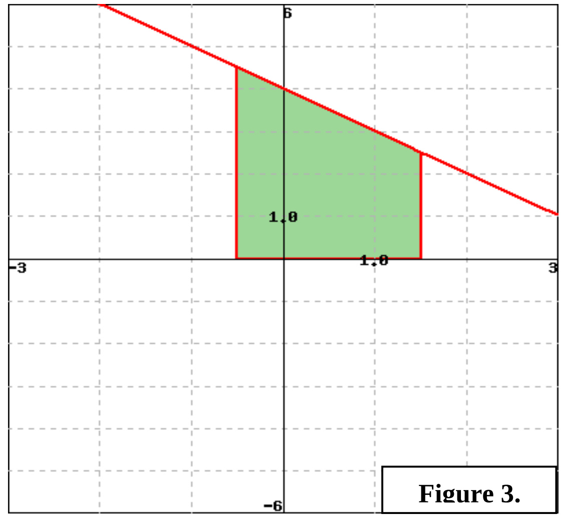

Figure 3.

8. **(Lesson 1.4)** Find the equation of the line in Figure 3 above and express the net area of the shaded region with a definite integral. Then use geometry to compute it.

9. **(Lesson 1.5)**
   (a) If an object travels along a line with constant velocity –22 m/s, then the general formula for the position of the object is $s = \int$ _____ = _____ .
   (b) If the object has initial position 253 m, then we can find the unknown constant *C*. In this case, the position function is $s =$ _____.
   (c) Using the position function, we find that the object is at the origin at time $t =$ _____.
   (d) The net change in the object's position (i.e., displacement) from time 8.25 s to time 13.75 s is _____.
   (e) The total distance traveled over the same time period is _____.
   (Note: Your answers should not contain an absolute value.)

10. **(Lesson 1.5)** Suppose $v(t) = 2 - 3t$ is the velocity (in meters per minute) of an object in rectilinear motion.
   (a) Sketch the graph of v on the interval [0, 2].
   (b) The t-intercept of $v(t)$ is the time at which the velocity is zero. In this case, the t-intercept is $t =$ _____.
   (c) Use the graph of $v(t) = 2 - 3t$ and geometry to find the displacement on [0, 2].
   (d) Use the graph of $|v(t)| = |\ 2 - 3t\ |$ and geometry to find the total distance traveled by the object on [0, 2].