1.
   a) 9 m/s
   b) $t = 2$ sec and $t = 4$ sec
   c) $0 \le t < 2$ and $t > 4$
   d) 44 m
   e) Speeding up: $2 < t < 3, t > 4$; Slowing down: $0 \le t < 2, 3 < t < 4$

2.
   a) $t = 1$ sec
   b) $t > 1$
   c) 22 m
   d) $a(t) = 6t,\ a(5) = 30$ m/s^2
   e) Speeding up: $t > 1$; Slowing down: $0 \le t < 1$

3.
   a) $t = 1$ sec and $t = 2$ sec
   b) $5\frac{1}{2}$ m
   c) -3 m/s^2
   d) Speeding up: $1 < t < 1.5, t > 2$; Slowing down: $0 \le t < 1, 1.5 < t < 2$

4. 16π in^2/in; 24π in^2/in; 32π in^2/in; The rate at which the surface area increases is increasing as the radius gets bigger.

5. 6π cm^2/cm; 8π cm^2/cm; 10π cm^2/cm; The rate at which the area of the circle increases is increasing as the radius gets bigger.

6. 36π cm^3/cm

7. 2π ft/ft

8. $\frac{1}{6}$ g/mm

9. $\frac{2}{27}$ oz/in (Note: "oz" stands for "ounces")

Review

10.
   a) $f'(x) = 3^{\sin 2x} \cdot \ln 3 \cdot \cos 2x \cdot 2$
   b) $\frac{dy}{dx} = -\frac{2}{x^2} - x^2 e^{-x} + 2xe^{-x} + e^x \csc(e^x) \cot(e^x)$
   c) $f'(x) = -\frac{1}{t(\ln t)^2} + 2t \operatorname{sech}^2(t^2)$