Review for Test 1

1. One of many possible answers: $y = 1.65\cos[\frac{\pi}{6}(t-5.7)] + 12.15$, where t is months since January 1

2. (a) In 2000, when the car is 5 years old, it will be worth \$8000.
   (b) $V = f(a) = -\frac{12}{5}a + 20$, line through (0,20) and (100/12,0)
   (c) The horizonal intercept gives the age of the car (8 1/3 years) when its value is 0; the vertical intercept gives the value of the car (\$20,000) when it was new.
   (d) The graph of f passes the horizontal line test.
   (e) $a = f^{-1}(V) = -\frac{5}{12}(V-20)$ (f) $f^{-1}(5) = 6.25$, which means that when the value of the car is \$5000, the car will be about 6.25 years old.

3. (a) $\sqrt{1.2} \approx 1.0954$
   (b) $\approx 9.54\%$
   (c) $\approx 9.12\%$
   (d) Just over seven years after the original investment was made.

4. (a) $y = -x^2 + 1$
   (b) $y = -(x^2 + 1)$
   (c) No, they are not the same. In this situation, reversing the transformations changes the direction of the shift.

5. (a) Average depth of the water
   (b) 7.5 meters
   (c) $2\pi/12.4$ (units are 1/hours)
   (d) High tide occurs C hours after midnight

6. $f(x) = 0.3x^2$, $g(x) = 2.1(1.3)^x$, $h(x) = 0.05x^3$

7. $y = \dfrac{2(x-1)^2}{(x+1)(x-3)}$

8. (a) $-4, -2, 0, 3, 6$
   (b) $-2, 0, 3$
   (c) 1, $-\infty$, 0
   (d) 2.5

9. $\displaystyle \lim_{h\to 0} \frac{-5(1+h)^2+5}{h} = \lim_{h\to 0} \frac{-5(1+2h+h^2)+5}{h} = \lim_{h\to 0} \frac{-5-10h-5h^2+5}{h} = \lim_{h\to 0} \frac{-10h-5h^2}{h}$
   $\displaystyle = \lim_{h\to 0} \frac{h(-10-5h)}{h} = \lim_{h\to 0}(-10-5h) = -10$

10. (a) -25 feet per second
    (b) ≈ 23 feet per second
    (d) (a) is the slope of a secant line through (2,49) and (3,24), and (b) is the slope of the line tangent to $y = s(t)$ at the point (1,42)