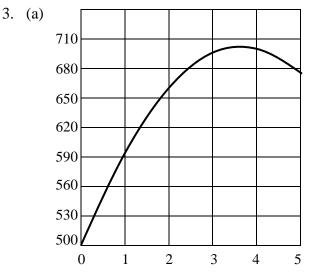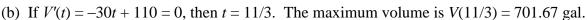# Activity 2.2 – Analyzing Quadratic Functions

1. (a) $x = -4, 4$

   (b) $x = -1, 0, 1$

   (c) $x = 0$ (Factor as $x^2\left(\frac{1}{2}x^2 + 2\right) = 0$, and note that $\frac{1}{2}x^2 + 2$ is never zero.)

   (d) $x = 4/5, 1$

   (e) $x = -3, -1, 1, 3$

2. (a) $5°F$

   (b) 1:00 a.m. and 2:30 a.m.

   (c) $T'(t) = 4t - 7$; rising by $5°F$ per hour

   (d) The low temperature occurred at 1:45 a.m. and was approximately $-1.125°F$.

   (e) Falling on $(0, 7/4)$; rising on $(7/4, 4)$

3. (a)

   (b) If $V'(t) = -30t + 110 = 0$, then $t = 11/3$. The maximum volume is $V(11/3) = 701.67$ gal.

   (c) $V(t) = -15t^2 + 110t + 500 = 0$ when $t = \frac{-110 \pm \sqrt{110^2 - 4\cdot(-15)\cdot 500}}{2\cdot(-15)} \approx -3.17$ or 10.5. We cast out the negative solution and find that it takes 10.5 minutes for the tank to empty.

4. Since $C'(x) = 0.0004x + 7$, we have $C'(1000) = 7.4$. The marginal cost is $7.40.