3.5 (2) a) \( f(10) = 10(50) = 500 \)
\( f(20) = 20(10) = 800 \)
\( f(45) = 45(15) = 675 \)

b) 

![Graph](image)

c) It represents the # minutes and the # cases sold where the # cases is maximal.

d) \( f(x) = -x^2 + 60x \)

Vertex: \( h = \frac{-b}{2a} = \frac{-60}{2(1)} = 30 \).

\( k = f(30) = 30(30) = 900 \).

Greg should spend 30 minutes and he will sell 900 cases.

4) Maximum height is at the vertex.

Vertex: \( h = \frac{-b}{2a} = \frac{-1000}{2(-16)} = 31.25 \)

\( k = -16(31.25)^2 - 1000(31.25) = 15625 \).

The maximum height is 156.25 feet and it happens at time 31.25 seconds.
b) \( q^2 + 200 = -10q + 3200 \)
\( q^2 + 10q - 3000 = 0 \)
\[ q = \frac{-10 \pm \sqrt{100 + 4(3000)}}{2} = \frac{-10 \pm \sqrt{12100}}{2} \]
\[ q = 50 \]
\[ p = (50)^2 + 200 = 2700 \]

So the equilibrium point is \((50, 2700)\).

c) The equilibrium quantity is 50.
The equilibrium price is 2700.

\[ 2q + 51 = \frac{3000}{q + 5} \]
\[ (2q + 51)(q + 5) = 3000 \] (as long as \( q + 5 \))

\[ 2q^2 + 9q + 51q + 255 = 3000 \]
\[ 2q^2 + 52q - 2745 = 0 \]
\[ q = \frac{-52 + \sqrt{(52)^2 - 4(2)(-2745)}}{2(2)} = 45 \]
\[ q = 45 \]
\[ p = 60 \] (\( p = 2q + 51 = 2(45) + 51 = 60 \))
16 \[ R(x) = 300x - x^2 \]
\[ C(x) = 65x + 7000 \quad 0 \leq x \leq 150 \]

**Break-Even Analysis:**
\[ 300x - x^2 = 65x + 7000 \]
\[ x^2 - 235x + 7000 = 0 \]

\[ x = \frac{235 \pm \sqrt{(235)^2 - 28000}}{2} \]

\[ x_1 = \frac{235 + \sqrt{27925}}{2} = \frac{235 + 165}{2} = 200 \]

\[ x_2 = \frac{235 - \sqrt{27925}}{2} = \frac{235 - 165}{2} = 35 \]

Since \( 0 \leq x \leq 150 \), it breaks even at \( x = 35 \).

22 \( a) \) Price per week: \( p(x) = 1.4 - \ 0.2x \) (in dollars)

\( b) \) Weight per week: \( w(x) = 100 + 5x \) (in pounds)

\( c) \) Revenue per week wanted: \[ R(x) = (1.4 - 0.2x)(100 + 5x) \]
\[ = -0.1x^2 + 2x + 40 \]

\[ R(x) = 40 - 0.1x^2 \] (in dollars)

\( d) \) Max of vertex. The vertex is \( h = \frac{-b}{2a} = \frac{-2}{2(-0.1)} = 0 \) and \( k = 40 - 0.1(0)^2 = 40 \).

So the farmer should pick the peaches **NOW**

\( e) \) The maximum revenue per tree is \$40. \)
3.6

2. \( y = 2x^6 \)

6. a) Yes
   b) Yes
   c) No (it has to be odd)
   d) Yes

12. \( x^4 + 4x^3 - 20 = f(x) \)

   should have shape

   That reduces the possibilities to (b), (f).
   \( f(0) = -20 \) so it can't be (b).

   Therefore the graph must be (f).

13. \( f(x) = x^2(x+2)(x-2) \)

   \( x \)-intercepts:
   \( x^2 = 0 \) so \( x = 0 \)
   \( x + 2 = 0 \) so \( x = -2 \)
   \( x - 2 = 0 \) so \( x = 2 \)

   goes through because \((x+2)\)

   Overall shape
   (even degree, positive leading coeff)

20. \( f(x) = x^3 + 2x^2 - 10 \)
   \( x = x(x^2 + 2x - 10) = x(x+\frac{\sqrt{144}}{2} - x) \)