9) \( x = a = \) tons of alfalfa
   \( y = c = \) tons of corn

\[ P = 250x + 350y \]

\[ x \geq 0, \ y \geq 0 \]
\[ x + y \leq 500 \rightarrow y \leq 500 - x \]
\[ 2x + 3y \leq 1200 \rightarrow y \leq 400 - \frac{2}{3}x \]

5) relevant vertices for a maximum
   \((0,400)\) \((300,200)\) \((500,0)\)

6) evaluation:
\[ P(x,y) = 250x + 350y \]
\[ P(0,400) = 250(0) + 350(400) = 140000 \]
\[ P(300,200) = 250(300) + 350(200) = 145000 \]
\[ P(500,0) = 250(500) + 350(0) = 125000 \]

Conclusion: the maximum profit of \$145,000.00 can be obtained by growing 300 tons of alfalfa and 200 tons of corn.

10) \( x = \# \) of economy model speakers (e)
    \( y = \# \) of deluxe model speakers (d)

\[ I = 50x + 200y \]

\[ x \geq 0, \ y \geq 0 \]
\[ 0x + 1y \leq 20 \rightarrow y \leq 20 \]
\[ 1x + 2y \leq 45 \rightarrow y \leq 22.5 - \frac{1}{2}x \]
\[ x + y \leq 35 \rightarrow y \leq 35 - x \]

5) relevant vertices:
   \((0,20)\) \((5,20)\) \((25,10)\) \((35,0)\)

6) evaluations:
\[ I(x,y) = 50x + 200y \]
\[ I(0,20) = 50(0) + 200(20) = 4000 \]
\[ I(5,20) = 50(5) + 200(20) = 4250 \]
\[ I(25,10) = 50(25) + 200(10) = 3250 \]
\[ I(35,0) = 50(35) + 200(0) = 1850 \]

Conclusion: the maximum income of \$4250.00 is achieved by manufacturing 5 economy and 20 deluxe speakers.
Brown, Advanced Mathematics §3.4 p. 114 #11-12

11) \( f = \) # free style skis
    \( r = \) # racing model skis

1) objective fn: \( P = 40f + 30r \)

2) restraints: \( 0 \leq f \leq 30 \)
    \( 0 \leq r \leq 20 \)

\[
2f + 3r \leq 96 \Rightarrow 3r \leq 96 - 2f
\]

3) relevant vertices:
   (0, 20) (30, 12)
   (18, 20) (30, 0)

4) \( P = 40f + 30r \)
   \( P(0, 20) = 0 + 30(20) = 600 \)
   \( P(18, 20) = 40(18) + 30(20) = 1320 \)
   \( P(30, 12) = 40(30) + 30(12) = 1560 \)
   \( P(30, 0) = 40(30) + 0 = 1200 \)

11(b) \( P = 20f + 30r \)
   \( P(0, 20) = 0 + 30(20) = 600 \)
   \( P(18, 20) = 20(18) + 30(20) = 960 \)
   \( P(30, 12) = 20(30) + 30(12) = 960 \)
   \( P(30, 0) = 20(30) + 0 = 600 \)

12) \( b = \) # board games
    \( m = \) # mechanical games

1) \( P = 10b + 15m \)

2) \( b \geq 0 \ m \geq 0 \)
   \( \frac{1}{2}b + m \leq 40 \Rightarrow m \leq 40 - \frac{1}{2}b \)
   \( \frac{1}{2}b + \frac{1}{2}m \leq 32 \Rightarrow m \leq 64 - b \)
   \( \frac{1}{4}b + \frac{1}{2}m \leq 18 \Rightarrow m \leq 36 - \frac{1}{2}b \)

3) vertices: (0, 36) (56, 8) (64, 0)

4) \( P = 10b + 15m \)
   \( P(0, 36) = 0 + 15(36) = 540 \)
   \( P(56, 8) = 10(56) + 15(8) = 680 \)
   \( P(64, 0) = 10(64) + 0 = 640 \)

\[
36 - \frac{1}{2}b = 64 - b
\]
\[
\frac{1}{2}b = 28
\]
\[
b = 56
\]

.. either producing 18 free style & 20 racing skis or
30 free style & 12 racing skis will earn the maximum profit of $960

.. a maximum profit of $680 is obtained by producing 56 board
   & 8 mechanical games