Farmer Joe can make a profit of $60 for every acre of rye grass harvested and $72 for every acre of orchard grass harvested.

Rye grass requires 5 hours per acre to harvest while orchard grass requires 10 hours per acres to harvest.

Farmer Joe has a total of 40 acres to farm rye grass and orchard grass.

The harvesting time available is 300 hours.

How many acres of each grass should the farmer grow in order to maximize his profit?

Define Variables

Let x = acres of rye grass

Let y = acres of orchard grass

$P(x,y) = 60x + 72y$ profit

Farmer Joe can make a profit of $60 for every acre of rye grass harvested and $72 for every acre of orchard grass harvested.

Rye grass requires 5 hours per acre to harvest while orchard grass requires 10 hours per acres to harvest.

Farmer Joe has a total of 40 acres to farm rye grass and orchard grass.

The harvesting time available is 300 hours.

How many acres of each grass should the farmer grow in order to maximize his profit?
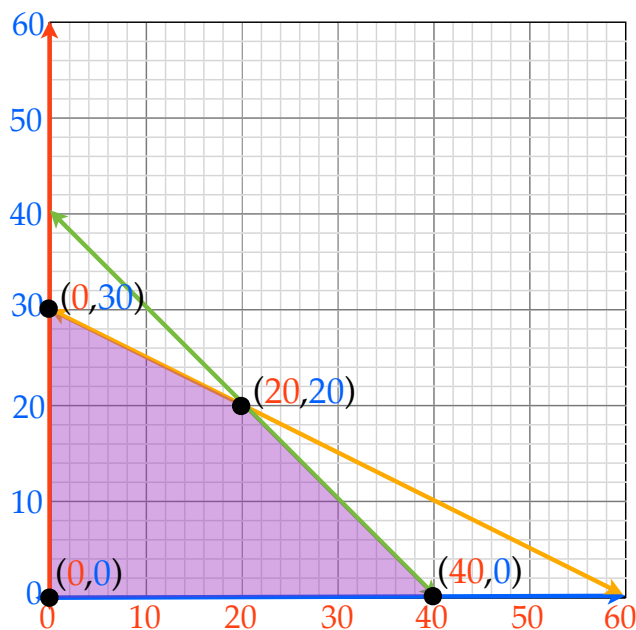
Define Variables

Let x = acres of rye grass

Let y = acres of orchard grass

$P(x,y) = 60x + 72y$ profit

$x \geq 0$ $y \geq 0$ $5x + 10y \leq 300$ $x + y \leq 40$

$y \leq -\frac{1}{2}x + 30$ $y \leq -x + 40$

Define Variables

Let x = acres of rye grass

Let y = acres of orchard grass

$P(x,y) = 60x + 72y$ profit

$x \geq 0$ $y \geq 0$ $5x + 10y \leq 300$ $x + y \leq 40$

$y \leq -\frac{1}{2}x + 30$ $y \leq -x + 40$

Critical Points

(0,0) $P(0,0) = 60 \cdot 0 + 72 \cdot 0 = \$0$

(0,30) $P(0,30) = 60 \cdot 0 + 72 \cdot 30 = \$2,160$

(20,20) $P(20,20) = 60 \cdot 20 + 72 \cdot 20 = \$2,640$

(40,0) $P(40,0) = 60 \cdot 40 + 72 \cdot 0 = \$2,400$

Farmer Joe can make a profit of $60 for every acre of rye grass harvested and $72 for every acre of orchard grass harvested.

Rye grass requires 5 hours per acre to harvest while orchard grass requires 10 hours per acres to harvest.

Farmer Joe has a total of 40 acres to farm rye grass and orchard grass.

The harvesting time available is 300 hours.

How many acres of each grass should the farmer grow in order to maximize his profit?

Define Variables

Let x = acres of rye grass

Let y = acres of orchard grass

$P(x,y) = 60x + 72y$ profit

Harvesting 20 acres of rye grass and 20 acres of orchard grass will produce the maximum profit of $2,640.

Critical Points

(0,0) $P(0,0) = 60 \cdot 0 + 72 \cdot 0 = \$0$

(0,30) $P(0,30) = 60 \cdot 0 + 72 \cdot 30 = \$2,160$

(20,20) $P(20,20) = 60 \cdot 20 + 72 \cdot 20 = \$2,640$ max

(40,0) $P(40,0) = 60 \cdot 40 + 72 \cdot 0 = \$2,400$

An office manager is buying file cabinets and wants to maximize storage space.

The office has 60 square feet and a budget of $900 to spend.

Cabinet A requires 3 square feet and cost $75. Cabinet A has a storage capacity of 12 cubic feet.

Cabinet B requires 6 square feet and cost $50. Cabinet B has a storage capacity of 18 cubic feet.

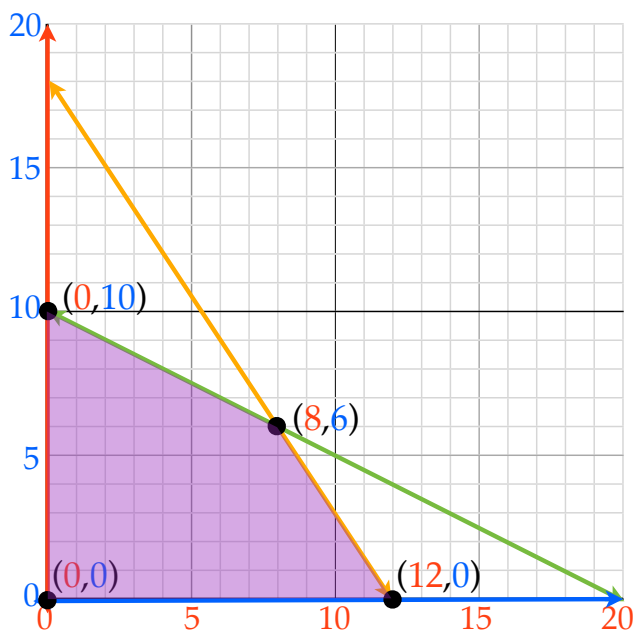How many of each cabinet should the office manager buy?

Define Variables

Let x = number of Cabinet A's
Let y = number of Cabinet B's

$S(x,y) = 12x + 18y$ storage space

$x \geq 0$ $y \geq 0$ $3x + 6y \leq 60$ $75x + 50y \leq 900$

$y \leq -\frac{1}{2}x + 10$ $y \leq -\frac{3}{2}x + 18$

Define Variables

Let x = number of Cabinet A's
Let y = number of Cabinet B's

$S(x,y) = 12x + 18y$ storage space

$x \geq 0$ $y \geq 0$ $3x + 6y \leq 60$ $75x + 50y \leq 900$

$y \leq -\frac{1}{2}x + 10$ $y \leq -\frac{3}{2}x + 18$

Critical Points

$(0,0)$ $S(0,0) = 12 \cdot 0 + 18 \cdot 0 = 0$ ft³

$(0,10)$ $S(0,10) = 12 \cdot 0 + 18 \cdot 10 = 180$ ft³

$(8,6)$ $S(8,6) = 12 \cdot 8 + 18 \cdot 6 = 204$ ft³

$(12,0)$ $S(12,0) = 12 \cdot 12 + 18 \cdot 0 = 144$ ft³

An office manager is buying file cabinets and wants to maximize storage space.

The office has 60 square feet and a budget of $900 to spend.

Cabinet *A* requires 3 square feet and cost $75. Cabinet *A* has a storage capacity of 12 cubic feet.

Cabinet *B* requires 6 square feet and cost $50. Cabinet *B* has a storage capacity of 18 cubic feet.

How many of each cabinet should the office manager buy?

Define Variables

Let x = number of Cabinet *A*'s

Let y = number of Cabinet *B*'s

$$S(x,y) = 12x + 18y \quad \text{storage space}$$

Purchasing 8 Cabinet *A*'s and 6 Cabinet *B*'s will give a maximum storage space of 204 ft^3.

Critical Points

$(0,0)$ $S(0,0) = 12 \cdot 0 + 18 \cdot 0 = 0$ ft^3

$(0,10)$ $S(0,10) = 12 \cdot 0 + 18 \cdot 10 = 180$ ft^3

$(8,6)$ $S(8,6) = 12 \cdot 8 + 18 \cdot 6 = 204$ ft^3 max

$(12,0)$ $S(12,0) = 12 \cdot 12 + 18 \cdot 0 = 144$ ft^3