

Name: _____

Date: _____

1. A thief is filling her backpack with two types of valuable substances. She can carry up to 35 kg, and her backpack can fit up to 15 liters.

Each bag of X has a weight of 0.02 kg, volume of 0.02 L, and value of 6 thousand USD.

Each bag of Y has a weight of 4 kg, volume of 0.3 L, and value of 200 thousand USD.

There is no requirement to take full bags, so the thief can opt for a fraction of a bag.

How many bags of each should the thief take to maximize her profit?

1. The thief should take 668.92 bags of X and 5.41 bags of Y . We can use linear programming to see this.

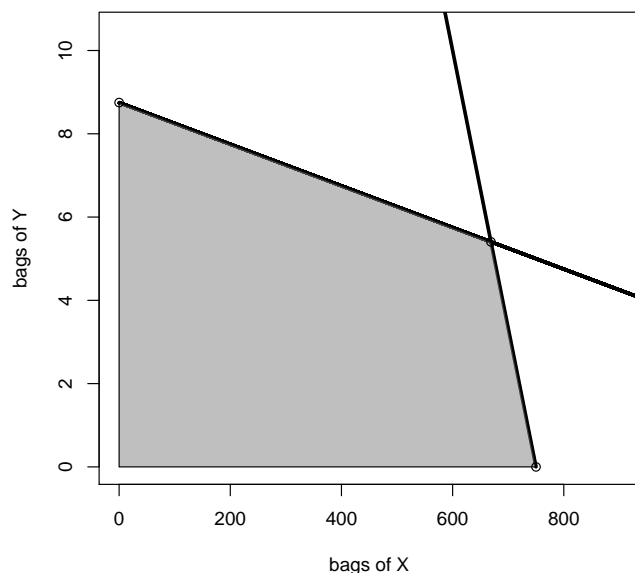
We write a weight inequality.

$$0.02x + 4y \leq 35$$

We write a volume inequality.

$$0.02x + 0.3y \leq 15$$

We graph the two inequalities, shading the feasible region.



There are three vertices of interest.

$$(0, 8.75)$$

$$(668.92, 5.41)$$

$$(750, 0)$$

We write a profit function (the objective function).

$$P(x, y) = 6x + 200y$$

We determine the profits.

$$P(0, 8.75) = 1750$$

$$P(668.92, 5.41) = 5094.59$$

$$P(750, 0) = 4500$$

Thus, the thief should take 668.92 bags of X and 5.41 bags of Y .