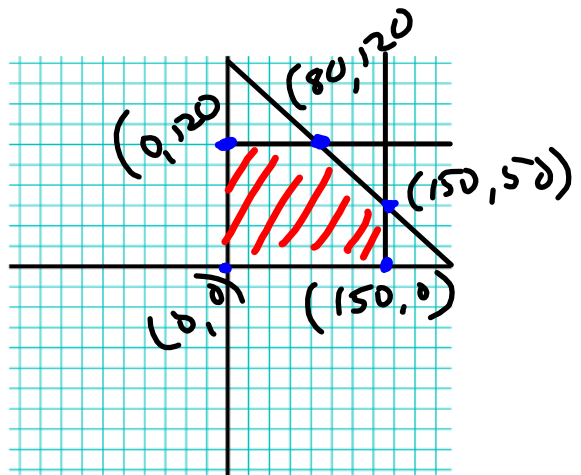


Consider this scenario: your school is planning to make hats and mittens to sell at the winter festival as a fundraiser. The school's sewing classes divide into two groups – one group can make hats, the other group knows how to make mittens. The sewing teachers are also willing to help out. Considering the number of people available and time constraints due to classes, only 150 hats and 120 pairs of mittens can be made each week. Enough material is delivered to the school every Monday morning to make a total of 200 items per week. Because the material is being donated by community members, each hat sold makes a profit of \$2 and each pair of mittens sold makes a profit of \$5.

- List the constraints.
- Graph the constraints.
- List the vertices of the feasible region.
- Write the Profit formula and use the vertices to determine the maximum profit.

$$\begin{aligned}x &\leq 150 \\y &\leq 120 \\x + y &\leq 200 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

$$P = 2x + 5y$$



Example - potter making cups and plates

A potter is making cups and plates. It takes her 6 minutes to make a cup and 3 minutes to make a plate. Each cup uses 3/4 lb. of clay and each plate uses one lb. of clay. She has 20 hours available for making the cups and plates and has 250 lbs. of clay on hand. She makes a profit of \$2 on each cup and \$1.50 on each plate. How many cups and how many plates should she make in order to maximize her profit?

$x = \text{cups}$
 $y = \text{plates}$

$$6x + 3y \leq 1200$$

$$\frac{3}{4}x + 1y \leq 250$$

$$x \geq 0$$

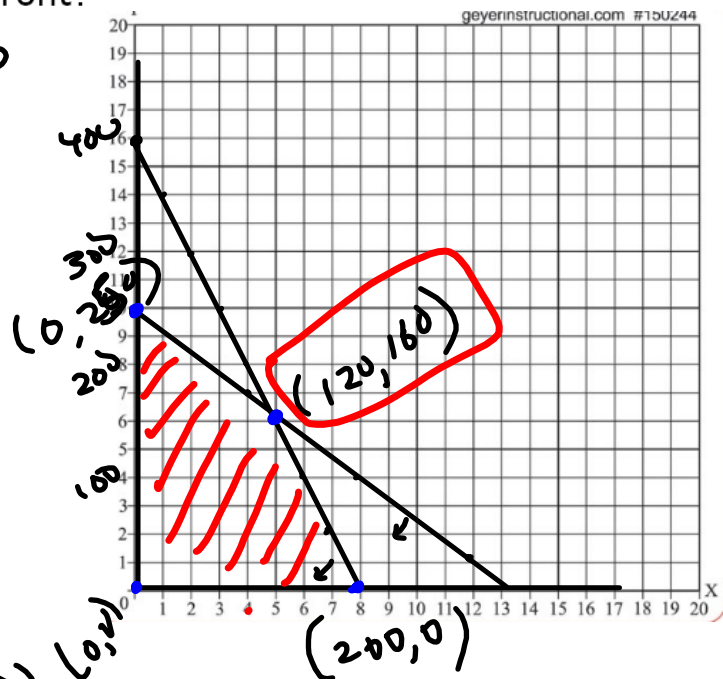
$$y \geq 0$$

$$y \leq -2x + 400$$

$$y \leq -\frac{3}{4}x + 250$$

$$P = 2x + 1.5y$$

$$P = 2(120) + 1.5(160) = 480$$



Farmer planting corn and soybeans

A farmer has a 320 acre farm on which she plants two crops: corn and soybeans. For each acre of corn planted, her expenses are \$50 and for each acre of soybeans planted, her expenses are \$100. Each acre of corn requires 100 bushels of storage and yields a profit of \$60; each acre of soybeans requires 40 bushels of storage and yields a profit of \$90. If the total amount of storage space available is 19,200 bushels and the farmer has only \$20,000 on hand, how many acres of each crop should she plant in order to maximize her profit? What will her profit be if she follows this strategy?

$x = \text{corn}$ $y = \text{soy}$

~~$x + y \leq 320$~~
 $50x + 100y \leq 20000$
 $100x + 40y \leq 19200$
 $x \geq 0$
 $y \geq 0$
 $y \leq -\frac{1}{2}x + 200$
 $y \leq -\frac{5}{2}x + 480$

$60x + 90y = P$

$60(140) + 90(130) =$

$20,100$

