Example 2

A manufacturer makes two kinds of radios, FM and AM-FM. The company has the equipment to manufacture any number of FM sets up to and including 600 per month. Or any number of AM-FM sets up to 525 per month. It takes 30 man-hours of labor to produce an FM radio, and 40 hours to produce an AM-FM. The firm has up to 24,000 man-hours available for radio production each month. If the profit gained on each FM radio is $16 and $24 for each AM-FM radio, find the number of each kind of radio the firm should manufacture to gain the greatest profit per month.

First things first, identify our constraints and optimizing equation.

And the profit statement, the objective function, to maximize the profit is **P(x, y) = 16x + 24y**

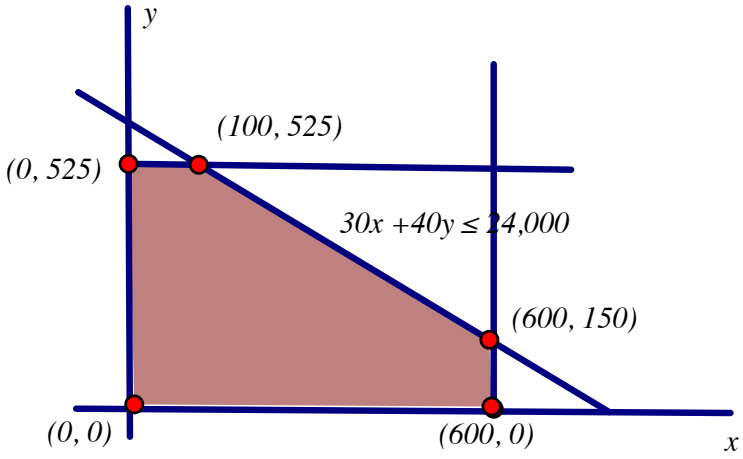
# of FM radios – x
# of AM/FM radios – y

Determining the constraints:

They can't make more than 600 FM radios $0 \leq x \leq 600$. The can't make more than 525 AM/FM radios $0 \leq y \leq 525$

It takes 30 hours to make FM radios; so time is 30x hours
It takes 40 hours to make AM/FM radios, so time is 40y hours
They have 24,000 hours available, so
$30x + 40y \leq 24{,}000$

Graphing the constraints, identifying the vertices (corners), we substitute those into the optimization equation.



P(x, y) = 16x + 24y

*P(0, 0) = 0
P(0, 525) = 12,600
P(100, 525) = 14,200
P(600, 150) = 13, 200
P(600, 0) = 9,600

The maximum value occurs at P(100, 525). That means to make the most profit, $14,200, the company would make 100 FM radios and 525 AM/FM radios.