

Maximizing a system.

Let's compare the number of green peppers in the Red Hot Sauce with the number of peppers needed in the Scorchin Hot Sauce with the available number of green peppers. We need 5 green peppers for each pint of Red Hot Sauce and 4 green peppers for each pint in Scorchin Hot sauce. Then do the same thing for Hot Chili Peppers.

Let x = number of Red Hot Sauce pints
 Let y = number of Scorchin Hot Sauce pints

| | x | y | <i>Totals</i> |
|------------------|-----|-----|---------------|
| <i>g peppers</i> | 5 | 4 | 1050 |
| <i>h peppers</i> | 4 | 8 | 1200 |

$$\begin{cases} 5x + 4y \leq 1050 \\ 4x + 8y \leq 1200 \end{cases}$$

Let's graph this using x and y intercepts.

$$5x + 4y = 1050 \quad \text{Note: } \frac{1050}{5} = 210$$

$$4x + 8y = 1200 \quad \text{Note: } \frac{1200}{8} = 150$$

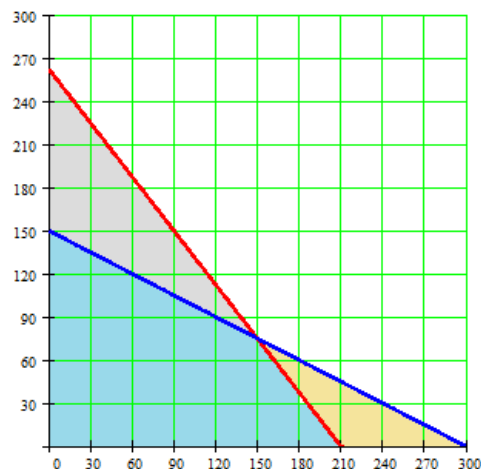
| x | y |
|-----|-------|
| 0 | 262.5 |
| 210 | 0 |

$$\frac{1050}{4} = 262.5$$

| x | y |
|-----|-----|
| 0 | 150 |
| 300 | 0 |

$$\frac{1200}{4} = 300$$

First graph the system of inequalities. Then find the corner points. If there is a maximum solution, then it will happen at a corner point.



Corner Points

| x | y |
|-----|-----|
| 0 | 0 |
| 0 | 150 |
| 150 | 75 |
| 210 | 0 |

Let's look at the Profit function
 $P = 1.2x + 1.0y$
 $P = 1.2x + y$

| x | y | x | y | $P = 1.2x + y$ |
|-----|-----|-----|-----|-----------------------|
| 0 | 0 | 0 | 0 | $1.2(0) + 0 = 0$ |
| 0 | 150 | 0 | 150 | $1.2(0) + 150 = 150$ |
| 150 | 75 | 150 | 75 | $1.2(150) + 75 = 255$ |
| 210 | 0 | 210 | 0 | $1.2(210) + 0 = 252$ |

IN this case, you would maximize profit, \$255, by producing 150 Red Hot pints and 75 Scorchin Hot pints.

Why does the corner principle work.

$$P = 1.2x + y$$

Note the slope of $y = -1.2x + P$ $slope = -1.2 = -\frac{6}{5}$

The place where the P line touches first will give the largest value for P. In this case, the line will touch at the corner point (150, 75) given the Profit of \$255. See table. A line with a different slope would touch a different corner point first.

