Ex.
A refinery produces oil and gas. At least 2 L of gasoline is produced for each liter of heating oil. The refinery can produce up to 9 million liters of heating oil and 6 million liters of gasoline each day. Gasoline is projected to sell for $1.10 per liter. Heating oil is projected to sell for $1.75 per liter. The company needs to determine the daily combination of gas and heating oil that must be produced to maximize revenue.

a) Assign variable and determine restrictions
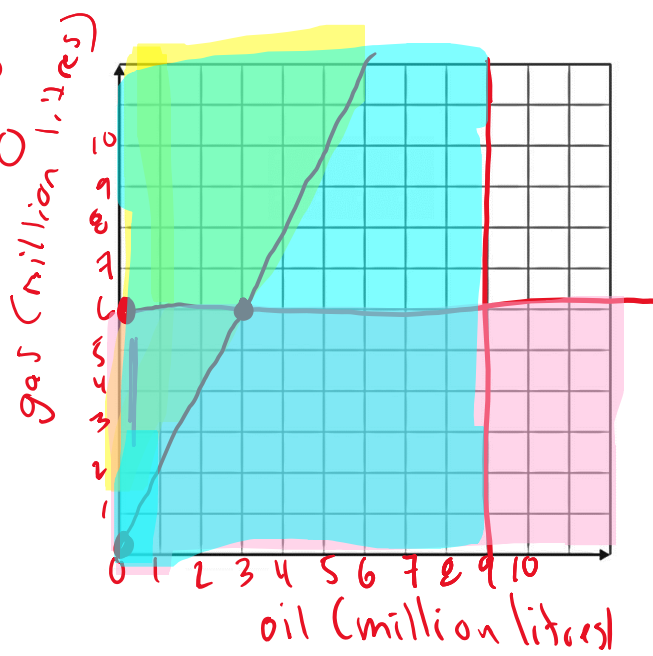
Let $x = $ oil
$y = $ gas

b) Write inequalities

$y \geq 2x$

$x \leq 9\,000\,000$
$y \leq 6\,000\,000$

c) Determine the objective function.

$C = 1.75x + 1.1y$

d) Rearrange for calculator

e) Graph

f) Find intersection points using calculator

① $(0,0)$ ② $(0, 6\,000\,000)$ ③ $(3\,000\,000, 6\,000\,000)$

g) Test points for min and max

$C = 1.75x + 1.1y$ ← objective function

① $(0,0) \rightarrow \$0$

② $1.75(0) + 1.1(6\,000\,000) = \$6\,600\,000$

③ $1.75(3\,000\,000) + 1.1(6\,000\,000) = \$11\,850\,000$

MAX revenue

Ex. L&G Construction is competing for a contract to build a fence. The fence will be no longer than 50 yards and will consist of narrow boards that are 6 inches wide and wide boards that are 8 inches wide. There must be no fewer than 100 wide boards and no more than 80 narrow boards. The narrow boards cost $3.56 each and the wide boards cost $4.36 each. Determine the maximum and minimum costs for the lumber to build the fence.

$$1800" = 50 \text{ yards}$$

a) Assign variable and determine restrictions

Let x = narrow
y = wide

b) Write inequalities

$$6x + 8y \le 1800 \qquad x \le 80 \qquad y \ge 100$$
$$300$$

c) Determine the objective function.

$$C = 3.56x + 4.36y$$
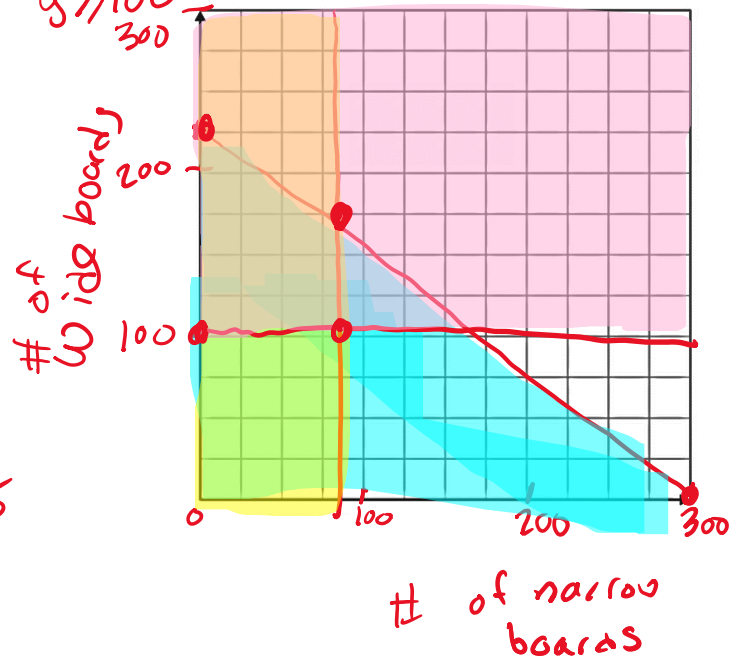
d) Rearrange for calculator

$$6x + 8y \le 1800$$
$$-6x \qquad\qquad -6x$$
$$8y \le -6x + 1800$$
$$\frac{8}{8}$$
$$y \le -\frac{3}{4} + 225$$

e) Graph

$$\frac{6x = 1800}{6}$$
$$x = 300$$

f) Find intersection points using calculator (or graph)

A $(80, 100)$ B $(0, 225)$ C $(0, 100)$ D $(80, 165)$

\# of wide boards

\# of narrow boards

g) Test points for min and max

Ⓐ $3.56(80) + 4.36(100) = \$720.80$

Ⓒ $3.56(0) + 4.36(100) = \$436$ [MIN]

Ⓑ $3.56(0) + 4.36(225)$
$\$981$

Ⓓ $3.56(80) + 4.36(165) =$
$\$1004.20$ [MAX]