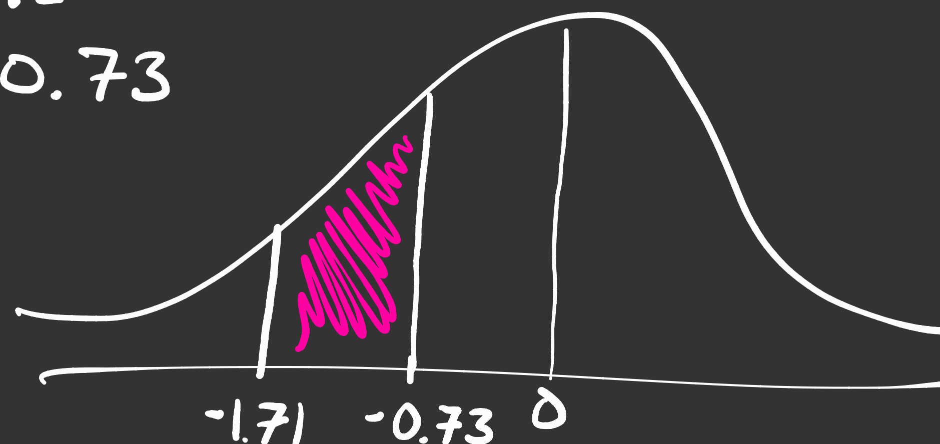
$$\mu = np = 30\left(\frac{1}{6}\right) = 5$$

$$\sigma = \sqrt{npq} = \sqrt{30 \cdot \frac{1}{6} \cdot \frac{5}{6}} = 2.0412$$

$$P_B(2 \le X \le 3) \approx P_N(1.5 \le X \le 3.5)$$

$$X = 1.5 \rightsquigarrow z = \frac{1.5 - 5}{2.0412} = -1.71$$

$$X = 3.5 \rightsquigarrow z = -0.73$$



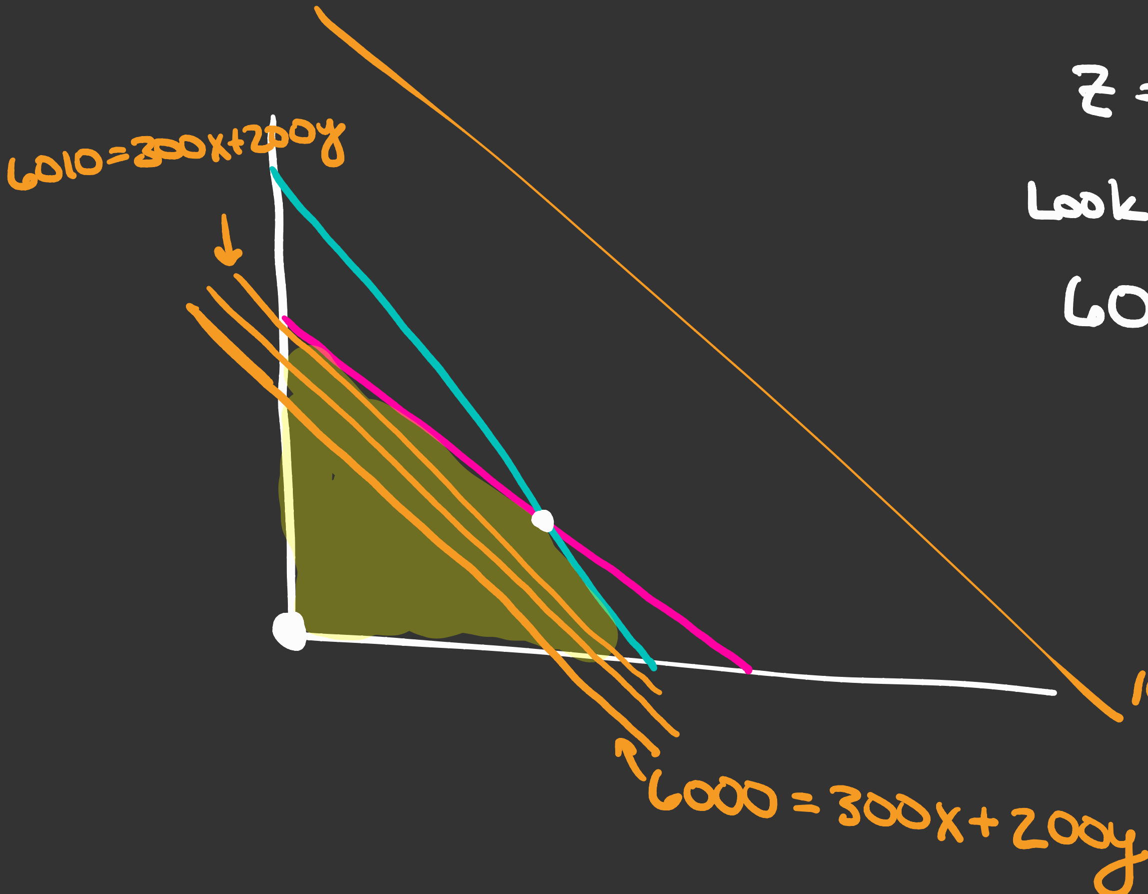
Key Fact: Given linear objective function w/ linear constraints, if the objective function has max/min, it must occur at corner of feasible region.

If feasible region is bounded, objective function has both max and min.

$z = 300x + 200y$

Look at

$6000 = 300x + 200y$



Example: Maximize $z = 5x + 10y$ subject to constraints

$$3x + 2y \geq 60 \qquad x \geq 0,\ y \geq 0$$

$$x + 4y \geq 40$$

$3x + 2y = 60$

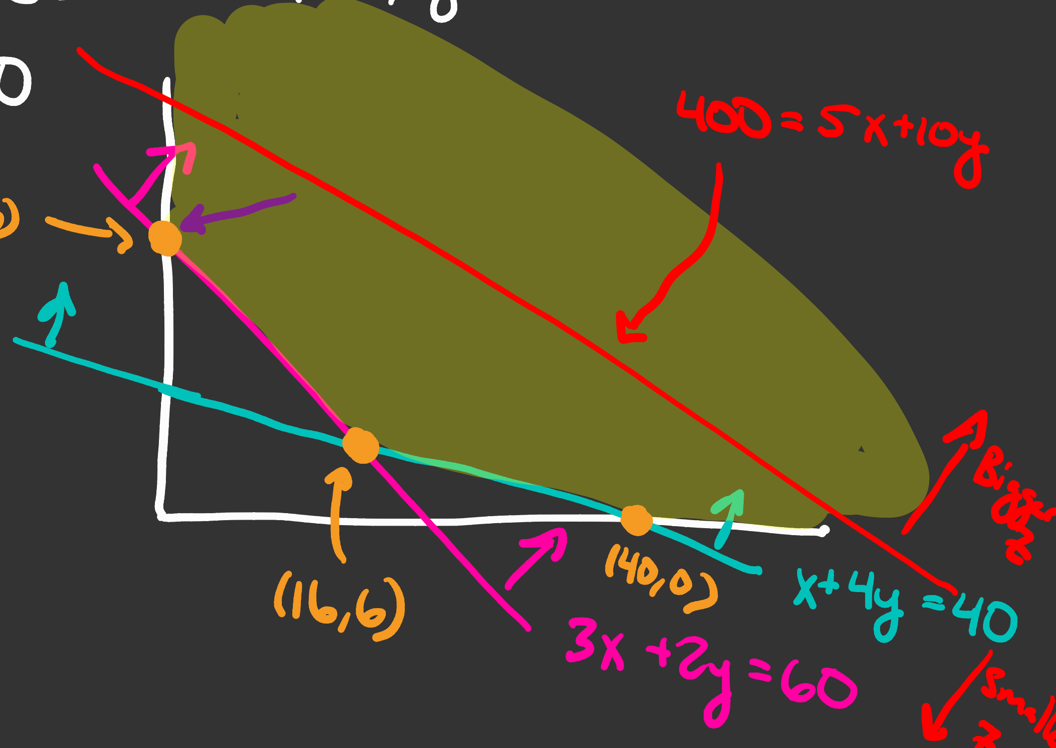
$x + 4y = 40 \rightsquigarrow x = 40 - 4y$

$3(40 - 4y) + 2y = 60$

$120 - 10y = 60$

$60 = 10y$

$y = 6 \rightsquigarrow x = 16$



$(0,30)$: $z = 5(0) + 10(30) = 300$

$(40,0)$: $z = 5(40) + 10(0) = 200$

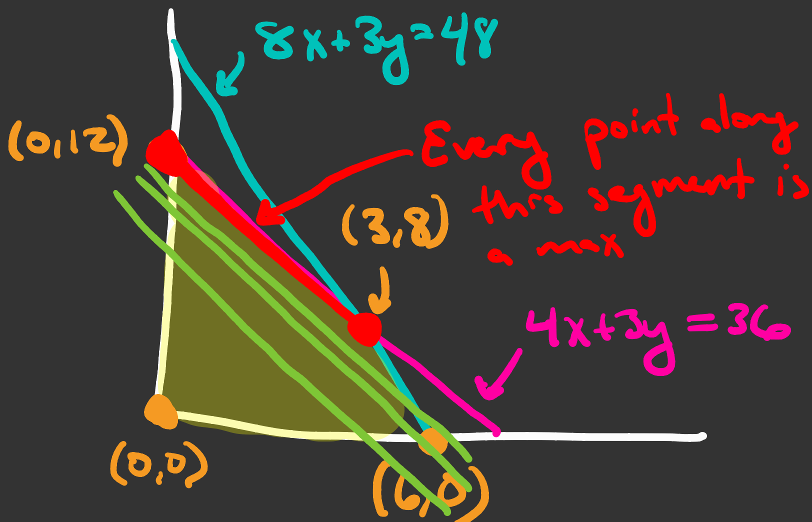
$(16,6)$: $z = 5(16) + 10(6) = \underline{140}$

Is 300 the max? No!!! Can increase forever since region is unbounded

It <u>does</u> have a minimum at $(16,6)$

Example: Maximize $z = 12x + 9y$ subject to the constraints

$$4x + 3y \leq 36 \qquad x \geq 0$$
$$8x + 3y \leq 48 \qquad y \geq 0$$



$(0,0) : z = 0 \leftarrow$ Min

$(0,12) : z = 108$

$(3,8) : z = 108$

Maxes

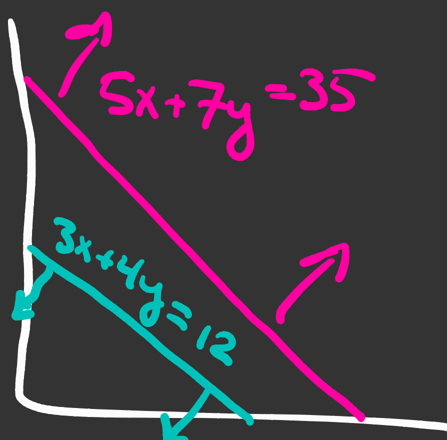
$(6,0) : z = 72$

<u>Multiple maxes (∞-many)</u>

Example: Maximize $z = 1000000x + \pi y$ subject to

$$5x + 7y \geq 35 \qquad x \geq 0$$

$$3x + 4y \leq 12 \qquad y \leq 0$$



Feasible region is empty!

$\Downarrow$

No max/min

Bounded Feasible Region	Has at least one max <u>and</u> one min (maybe more) Check corners
Unbounded F.R.	Might have max/min • Check corners • Check direction in which z increases/decreases
Empty F.R.	No max or min