

Systems of Equations

Example $-3x - 7y = 3$

$$x + 2y = -1$$

Substitution Solve for 1 variable in terms of the other

$$x + 2y = -1 \Rightarrow x = -1 - 2y$$

Then substitute into the other equation

$$-3(-1 - 2y) - 7y = 3$$

$$-3(-1-2y) - 7y = 3 \quad X = -1 - 2y$$

$$3 + 6y - 7y = 3$$

$$3 - y = 3$$

$$y = 0$$

$$X = -1 - 2 \cdot 0$$

$$X = -1$$

2nd Method

Elimination add or subtract

multiples of equations to
eliminate 1 variable

$$4x + 12y = -8$$

$$4x + 12(-1) = -8$$

$$+ \quad -4x - 12y = 9$$

$$4x - 12 = -8$$

$$+12 \quad +12$$

$$-y = 1$$

$$4x = 4$$

$$y = -1$$

$$x = 1$$

Solve for 1 variable
and plug in to find
the other

$$2(3x + 5y = 13) \quad 6x + 10y = 26$$

$$6x - 2y = 2 \quad - \quad 6x - 2y = 2$$

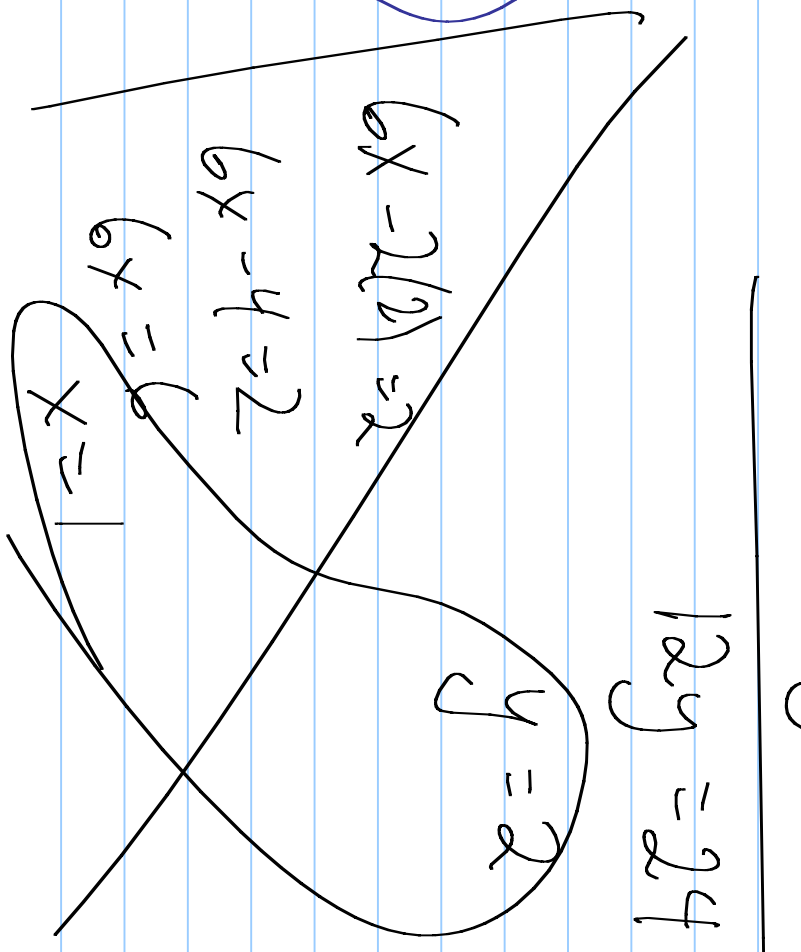
Alternatively

$$-2(3x + 5y = 13)$$

$$-6x - 10y = -26$$

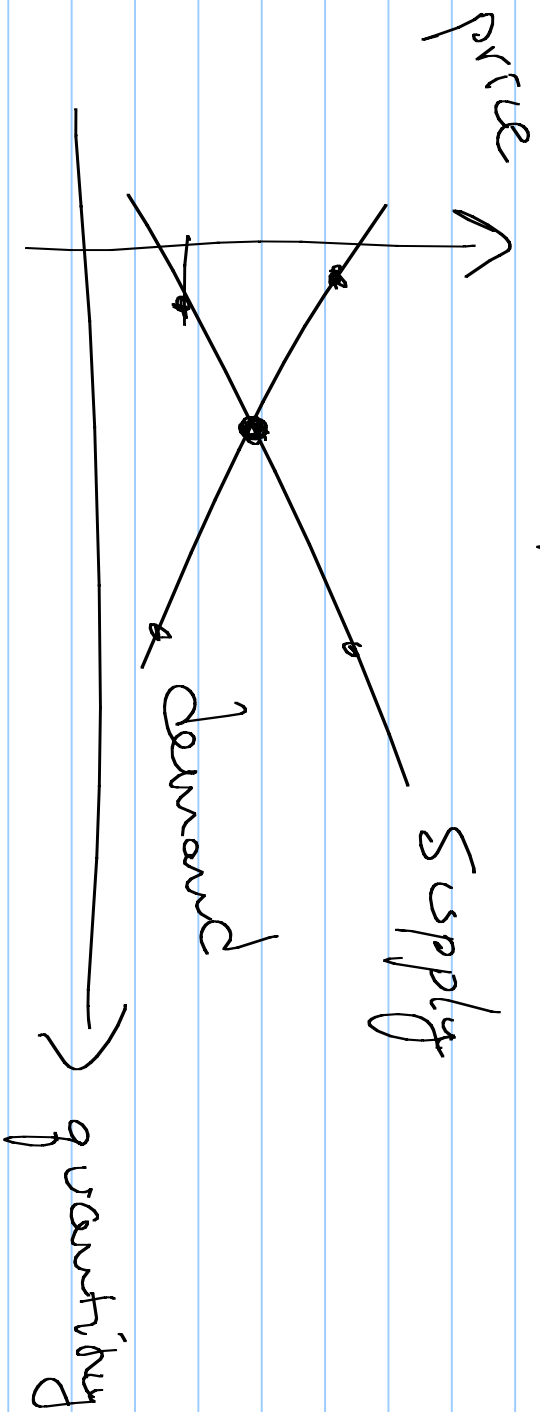
$$+ \quad \frac{6x - 2y = 2}{-12y = -24}$$

$$y = 2$$



$$12y = 24$$

Market Equilibrium



$$\text{Demand } p + 2q = 200 \quad (q = 100 - \frac{1}{2}p)$$

$$\text{Supply } p - 5q = 60 \quad (q = \frac{1}{5}p + 12)$$

$$P + 2q = 200$$

$$P - 5q = 60$$

$$7q = 140$$

$$(A) \quad P = 60 \quad q = 20$$

$$(B) \quad P = 120 \quad q = 60$$

$$(C) \quad P = 160 \quad q = 20$$

$$(D) \quad P = 20 \quad q = 160$$

$$7q = 140$$

$$q = 20$$

$$P + 2(20) = 200$$

$$P + 40 = 200$$

$$P = 160$$

(E) Cost tell from

Info given

Linear Inequalities

$$\begin{array}{r} -9x + 7 \geq -11x - 11 \\ +11x \quad +11x \end{array}$$

$$\begin{array}{r} 2x + 7 \geq -11 \\ -7 \quad -7 \\ 2x \geq -18 \end{array}$$

$$x \geq -9$$

$$\begin{array}{r} -9x + 7 \geq -11x - 11 \\ +9x \quad +9x \end{array}$$

$$\begin{array}{r} 7 \geq -2x - 11 \\ 18 \geq -2x \end{array}$$

$$-9 \leq x$$

flip
if multiply
or divide
signs.

Double Inequalities

$$80 < \text{Blood Sugar} < 160$$

Example

$$3x + 1 < 4x + 7 < 3x + 12$$

$$3x + 1 < 4x + 7$$

$$1 < x + 7$$

$$-6 < x$$

$$4x + 7 < 3x + 12$$

$$x + 7 < 12$$

$$x < 5$$

$$-6 < x < 5$$

Time Served / Time Sentence (in months)

$$Y = .554X - 2.886$$

If we want time served to be between 3 years and 5 years then the inequality to solve is

$$36 < .554X - 2.886 < \underline{60}$$

convert years to months

$$\text{Note } 36 > .554X - 2.886 > 60$$

is incorrect since you want more than 36 and less than 60, not the other way around which would be impossible