

Office hours: M: 1pm

CW 22

T: 2:30 pm

(By appt).

1.5 - Linear Equations (wrap up).

Ex) The interest paid on a \$10,000 debt over 3 years is given by

$$y = 175.393x - 116.287,$$

where x represents the interest rate

If the interest is \$1637.60, what is x ?

$$\begin{array}{r} 1637.60 = 175.393x - 116.287 \\ + 116.287 \qquad \qquad \qquad + 116.287 \end{array}$$

$$\begin{array}{r} 1753.887 = 175.393x \\ \hline 175.393 \qquad \qquad \hline 175.393 \end{array}$$

$$x \approx 9.9998$$

$$x \approx 10\%$$

Online HW - Graphs of Lines

Ex) Graph $-x + 3y = -21$

$$\begin{array}{r} -x + 3y = -21 \\ +x \qquad \qquad \qquad +x \end{array}$$

$$\frac{3y}{3} = \frac{x - 21}{3}$$

$$y = \frac{1}{3}x - 7$$

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y-intercept: $(0, -7)$

(1 pt on the line)

Pick an x-value that's easy to work with.

$$x = 3$$

$$\frac{1}{3}(3) - 7$$

$$(3, -6),$$

$$= 1 - 7$$

$$= -6$$

↗ another
pt.

$$\frac{-x}{-1} = \frac{1+y}{-1}$$

← $x = -1 - y$ Plug into 1st equation

$$5(-1-y) + 3y = -9 \quad \text{Solve for } y$$

$$-5 - 5y + 3y = -9$$

$$-5 - 2y = -9$$

$$\begin{array}{r} +5 \qquad \qquad \qquad +5 \\ \hline \qquad \qquad \qquad -2y = -4 \end{array}$$

$$y = 2$$

$$x = -1 - 2 = -3$$

$$\boxed{(-3, 2)} \quad \text{Solution}$$

② Elimination

$$\begin{array}{r} 5x + 3y = -9 \\ 3(-x - y = 1) \end{array}$$

$$\left\{ \begin{array}{l} 5x + 3y = -9 \\ -3x - 3y = 3 \end{array} \right.$$

$$\frac{2x}{2} = \frac{-6}{2}$$

$$x = -3$$

Plug into
original
equation.

$$5x + 3y = -9$$

$$5(-3) + 3y = -9$$

$$-15 + 3y = -9$$

$$\begin{array}{r} +15 \qquad \qquad +15 \\ \hline \end{array}$$

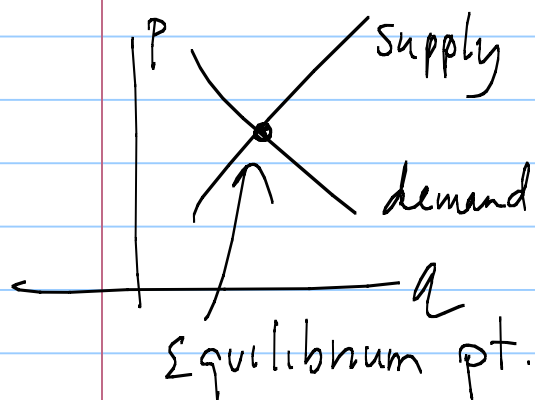
$$3y = 6$$

$$y = 2$$

Ex) Supply and Demand

Demand is given by $p + 2q = 200$

Supply is given by $p - 5q = 60$



Find the equilibrium point.

(i.e., solution to the system)

$$\begin{array}{r} p + 2q = 200 \\ -1(p - 5q = 60) \end{array}$$

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

$$p + 40 = 200$$

$$p = \cancel{\$} 160$$

$$\underline{(20, \cancel{\$} 160)}$$

Solution

$$\begin{array}{r} p + 2q = 200 \\ -p + 5q = -60 \\ \hline \end{array}$$

$$7q = 140$$

$$q = 20$$

$$\begin{aligned} 5(p + 2q) &= 200 \\ 2(p - 5q) &= 60 \end{aligned}$$

$$\begin{array}{r} \overline{)1120} \\ 7 \overline{)1120} \\ \underline{-7} \\ 42 \end{array}$$

$$\begin{array}{r} 5p + 10q = 1000 \\ 2p - 10q = 120 \\ \hline 7p = 1120 \end{array}$$

1.8 / Inequalities

Recall: Profit = Revenue - Cost

You are ☺ if Revenue \geq Cost

Ex) Revenue: $R(x) = 30x$

Cost: $C(x) = 10x + 1500$

(x : # of units)

For what values of x do we have profit?

$$R(x) > C(x)$$

$$\begin{array}{r} 30x > 10x + 1500 \\ -10x \quad -10x \\ \hline \end{array}$$

$$\frac{20x}{20} > \frac{1500}{20} \quad x > 75 \text{ units}$$

(*) When multiplying/dividing by a negative #, sign switches direction

$$\text{Ex)} \quad \begin{array}{r} -5x + 3 \leq x + 5 \\ \underline{\quad -3 \quad} \quad \underline{\quad -3 \quad} \end{array}$$

$$\begin{array}{r} -5x \leq x + 2 \\ \underline{-x} \quad \underline{-x} \end{array}$$

$$\begin{array}{r} -6x \leq 2 \\ \underline{-6} \quad \underline{-6} \end{array}$$

$$x \geq -\frac{1}{3}$$

Ex) "Double Inequality"

$$80 \leq \frac{261+x}{4} \leq 90$$

$$80 \leq \frac{261+x}{4}$$

AND

$$\frac{261+x}{4} \leq 90$$

$$\begin{array}{r} 320 \leq 261+x \\ -261 \quad -261 \\ \hline \end{array}$$

$$59 \leq x$$

(or $x \geq 59$)

$$\begin{array}{r} 261+x \leq 360 \\ -261 \quad -261 \\ \hline \end{array}$$

$$x \leq 99$$

And

$$\boxed{59 \leq x \leq 99}$$

Answer

\geq : at least
greater than or equal to

\leq : at most