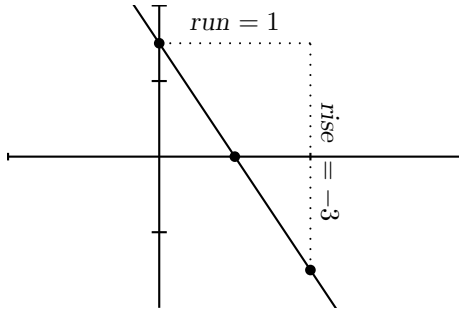


Show all work for full credit. Use the back if you would like more space.

1. Graph $x = \frac{3-2y}{6}$. Make it clear how you arrived at the picture you draw.



Method 1: Find two points on the line and graph from those.

x	y
0	$\frac{3}{2}$
$\frac{1}{2}$	0

Start with 0's in table, plug into equation and solve for other variable.

$$\begin{aligned}
 0 &= \frac{3-2y}{6} \\
 6 \cdot 0 &= \frac{3-2y}{6} \cdot 6 \\
 0 &= 3-2y \\
 -3 &= -2y \\
 \frac{3}{2} &= y
 \end{aligned}$$

and then,

$$\begin{aligned}
 x &= \frac{3-2 \cdot 0}{6} \\
 x &= \frac{3}{6} \\
 x &= \frac{1}{2}
 \end{aligned}$$

Now plot points and connect dots.

Method 2: Convert to $y = mx + b$ form and plot

using slope and intercept.

$$\begin{aligned}
 x &= \frac{3-2y}{6} \\
 6x &= \frac{3-2y}{6} \cdot 6 \\
 6x &= 3-2y \\
 6x-3 &= -2y \\
 \frac{6x-3}{-2} &= y \\
 \frac{6x}{-2} + \frac{-3}{-2} &= y \\
 -3x + \frac{3}{2} &= y
 \end{aligned}$$

y -intercept is $\frac{3}{2}$ and slope is $-\frac{3}{1}$, graph from that data.

2. Solve

$$\begin{aligned}
 2x + 6y &= 42 \\
 3(x + 2y) &= x - 12
 \end{aligned}$$

Step 1: Solve one equation for one of the variables. I Choose the first equation for x .

$$\begin{aligned}
 2x + 6y &= 42 \\
 2x &= 42 - 6y \\
 x &= 21 - 3y
 \end{aligned}$$

Step 2: Plug into other equation.

$$\begin{aligned}
 3((21-3y) + 2y) &= (21-3y) - 12 \\
 3(21-3y+2y) &= 21-3y-12 \\
 3(21-1y) &= 9-3y \\
 63-3y &= 9-3y \\
 63-3y+3y &= 9-3y+3y \\
 63 &= 9
 \end{aligned}$$

Oh no! a contradiction! There is no solution!

3. In economics a supply equation is a formula for the number of products the market is willing to produce at any given price. Similarly, the demand equation is a formula for the number of products consumers are willing to buy at any given price. The market equilibrium is where these two formulas agree (are solved simultaneously). Suppose that

the equations below are the supply and demand functions for widgets.

$$q = 80p - 1000 \quad \text{supply equation}$$

$$q = -50p + 3144 \quad \text{demand equation}$$

- a. What is the slope of the supply equation? Is it positive or negative, and why does it make sense that it is that way?

The supply equation is $q = 80p - 1000$, it has slope 80 which is positive. The supply equation relates the price of a widget to the quantity that the producers are willing to manufacture. If the price of a widget were to increase then manufacturers would produce more widgets since there is more motivation to do so (they make more money on each widget sold). Thus the slope of the supply equation should be positive. Contrast this with the demand formula where the slope is negative since the amount demanded decreases when the price increases.

- b. What is the market equilibrium point?

Step 1: Solve one equation for one of the variables. I Choose the first equation for q .

$$q = 80p - 1000$$

done.

Step 2: Plug into other equation.

$$80p - 1000 = -50p + 3144$$

$$130p = 4144$$

$$p = 31.8769230769$$

Step 3: Plug this p -value into an equation so that we can solve for q .

$$q = 80 \cdot 31.8769230769 - 1000$$

$$q = 2550.15384615 - 1000$$

$$q = 1550.15384615$$

Thus the market equilibrium is $(31.88, 1550)$.

- c. Interpret your solution to part b., what does it tell us about the price and quantity of widgets sold?

Eventually the price of a widget will be \$31.88 and 1550 widgets will be sold since that is the price and quantity where the suppliers and consumers agree.

4. Solve the inequality, write the solution set in interval notation, and graph the solution set.

$$0.4x + 0.4 \leq 0.1x + 0.85$$

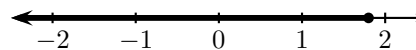
$$0.4x + 0.4 \leq 0.1x + 0.85$$

$$0.3x + 0.4 \leq 0.85$$

$$0.3x \leq 0.54$$

$$x \leq 1.8$$

In interval notation this is $(-\infty, 1.8)$ and the graph is:



5. Solve $|8 - 5x| = 18$.

We split the absolute value into two equations:

$$8 - 5x = 18 \quad \text{or} \quad 8 - 5x = -18$$

$$-5x = 10 \quad \text{or} \quad -5x = -26$$

$$x = -2 \quad \text{or} \quad x = \frac{26}{5}$$

The solutions are $x = -2$ or $x = \frac{26}{5}$

6. Solve the inequality, write the solution set in interval notation, and graph the solution set.

$$\left| \frac{1}{3}x + 7 \right| + 5 > 6$$

This one we first have to subtract the 5 from both sides.

$$\left| \frac{1}{3}x + 7 \right| > 1$$

Now we split the inequality and solve.

$$\frac{1}{3}x + 7 > 1 \quad \text{or} \quad \frac{1}{3}x + 7 < -1$$

$$\frac{1}{3}x > -6 \quad \text{or} \quad \frac{1}{3}x < -8$$

$$x > -18 \quad \text{or} \quad x < -24$$

The solution in interval notation is $(-\infty, -24) \cup (-18, \infty)$ and the graph is:

