

Math 80
Exam 1 Solutions

1. (10 pts.) Find the solutions for the following equations.

(a) (pts.) $\frac{2}{3}a + 5 = \frac{1}{4}a$

To make the equation nicer to work, clear the fractions by multiplying both sides by 12:

$$\begin{aligned}12\left(\frac{2}{3}a + 5\right) &= 12\left(\frac{1}{4}a\right) \\ \frac{24}{3}a + 60 &= \frac{12}{4}a \\ 8a + 60 &= 3a \\ 5a &= -60 \Rightarrow a = -12\end{aligned}$$

(b) (10 pts.) $3(p + 5) - 5 + 2p = 5(p + 2)$

Simplifying both sides and solving:

$$\begin{aligned}3p + 15 - 5 + 2p &= 5p + 10 \\ 5p + 10 &= 5p + 10 \\ 0 &= 0\end{aligned}$$

This implies that any value of p will satisfy the equation. So the solution set is **all real numbers**.

2. (10 pts.) Solve the following equations for the indicated variable.

(a) (pts.) Solve $P = 2L + 2W$ for the variable W .

First, isolate all the terms containing W on one side and the terms without W on the other by subtracting $2L$:

$$P - 2L = 2W$$

Now isolate the W by dividing both sides by 2:

$$\frac{P-2L}{2} = W$$

(b) (10 pts.) Solve $A = \frac{3}{2}(B - 4)$ for the variable B .

Here are a couple of ways to go about solving for B :

- Option 1:

Distribute the $\frac{3}{2}$ on the right side: $A = \frac{3}{2}B - 6$

Isolate the terms containing B : $A + 6 = \frac{3}{2}B$

Multiply both sides by $\frac{2}{3}$: $\frac{2}{3}A + 4 = B$

- Option 2:

Multiply both sides by $\frac{2}{3}$: $\frac{2}{3}A = B - 4$

Add 4 to both sides: $\frac{2}{3}A + 4 = B$

3. (5 pts.) Consider the linear equation $8x - 2y = 6$.

(a) (pts.) Is $(2, -5)$ a solution to the equation?

Plugging in $x = 2$ and $y = -5$, the left-side of the equation yields

$$8(2) - 2(-5) = 16 + 10 = 26 \neq 6.$$

$\Rightarrow (2, -5)$ is not a solution to the equation.

(b) (6 pts.) Complete the following table of ordered pairs for the equation.

x	y
1	1
2	5
-2	-11

(c) (6 pts.) What are the x and y -intercepts for the graph of $8x - 2y = 6$?

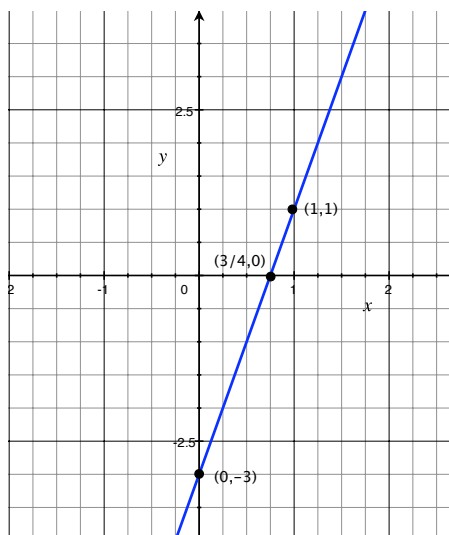
x -intercept: Setting $y = 0$, we have $8x = 6 \Rightarrow x = \frac{3}{4}$

So the x -intercept is the point $(\frac{3}{4}, 0)$.

y -intercept: Setting $x = 0$, we have $-2y = 6 \Rightarrow y = -3$

So the y -intercept is the point $(0, -3)$.

(d) (7 pts.) Use the information in parts (b) and (c) to graph the equation $8x - 2y = 6$ below.



(e) (6 pts.) What is the slope of the line?

Any 2 points from parts (b) and (c) can be used to compute the slope of the line.

Using $(1, 1)$ and $(0, -3)$, we have slope = $\frac{1 - (-3)}{1 - 0} = 4$.

4. (15 pts.) You find a well-paying summer job selling “I ♥ Seattle” t-shirts and mugs. The mugs are more popular and it turns out that for every t-shirt you sell, you sell 12 mugs. Suppose on a particular day, you sell a total of 182 items. How many of each item did you sell? (Set up a linear equation to solve.)

Unknowns: Number of t-shirts sold = x
Number of mugs sold = $12x$

Since you sold 182 items total, we have that $x + 12x = 182 \Rightarrow 13x = 182$.
 $x = 14$

So, you sold 14 t-shirts and 168 mugs.

5. (15 pts.) While selling t-shirts and mugs, you managed to save \$5000 to put into investments. You decide to invest some of it in a bond that has an annual interest rate of 12%, and the rest in an account that has an annual interest rate of 8%. After a year, you have made \$540 in interest. How much did you invest at 12% and 8%? (Set up a linear equation to solve.)

Unknowns: Amount invested at 12% = x
Amount invested at 8% = $5000 - x$

Organizing the data:

Amount Invested	Interest Rate	Interest
x	12%	$.12x$
$5000 - x$	8%	$.08(5000 - x)$

Since you made a total of \$540 in interest, we have that $.12x + .08(5000 - x) = 540$.
 $\Rightarrow .12x + 400 - .08x = 540$
 $\Rightarrow .04x = 140$
 $\Rightarrow x = 3500$

So, you invested \$3500 at 12% and \$1500 at 8%.