# Review Set 1 Solutions

Here are the solutions to the questions not listed in the text.

1. (App. B) Find an equation of the line that satisfies the given condition:

   (a) Through $(2, -3)$ perpendicular to $2x + 5y + 8 = 0$
   SOLUTION: We have a point, and the slope can be determined from the given line- That line has slope (solve the equation for $y$) $-2/5$, so our new slope is $5/2$:

   $$y + 3 = \frac{5}{2}(x - 2)$$

   (b) Perpendicular to the previous line, through $(1, 1)$.
   SOLUTION: Perpendicular again means the slope is back to $-2/5$:

   $$y - 1 = -\frac{2}{5}(x - 1)$$

2. (App B) Find the point on the $y-$axis that is equidistant from $(5, -5)$ and $(1, 1)$. HINT: How is a generic point on the $y-$axis represented?

   SOLUTION: A generic point on the $y-$axis is given by $(0, y)$. The distance between $(0, y)$ and $(5, -5)$ is given by:

   $$\sqrt{(0-5)^2 + (y+5)^2} \text{ or } \sqrt{y^2 + 10y + 50}$$

   The distance between $(0, y)$ and $(1, 1)$ is given by:

   $$\sqrt{(0-1)^2 + (y-1)^2} = \sqrt{y^2 - 2y + 1}$$

   Set these equal to each other (and square both sides) to find that $y = -4$.

3. (App A) Solve the inequality for $x$:

   (a) $1 < 4 - 2x \leq 5$
   SOLUTION: Subtract 4, then divide by $-2$ (and flip the inequalities):

   $$-\frac{1}{2} \leq x < \frac{3}{2}$$

   (b) $\dfrac{(x-1)(x+2)}{(x+1)} \geq 0$
   SOLUTION: Use the sign chart analysis we discussed in class.

   | | | | | |
   |---|---|---|---|---|
   | $x-1$ | $-$ | $-$ | $-$ | $+$ |
   | $x+2$ | $-$ | $+$ | $+$ | $+$ |
   | $x+1$ | $-$ | $-$ | $+$ | $+$ |
   | | $x < -2$ | $-2 < x < -1$ | $-1 < x < 1$ | $x > 1$ |

   $$\Rightarrow \quad -2 \leq x < -1 \text{ or } x \geq 1$$

4. (App C) Write the equation of the circle of radius 3 centered at $(-2, 5)$.

   SOLUTION: $(x+2)^2 + (y-5)^2 = 3^2$

5. (App C) Write the equation of the ellipse that has its major/minor axes parallel to the $x-$ and $y-$ axes respectively, centered at $(3, 4)$ with axes lengths 4 and 3, respectively.

   SOLUTION (Note: The axes of an ellipse are like the diameter of a circle):

$$\frac{(x-3)^2}{2^2} + \frac{(y-4)^2}{(3/2)^2} = 1$$

6. Complete the square: $2x^2 - 4x + 1$ (Recall that your answer should be in the form: $a(x-b)^2 + c$ for suitable numbers $a, b, c$).

   SOLUTION: When I complete the square, I like to factor out the leading term:

$$2x^2 - 4x + 1 = 2(x^2 - 2x) + 1 = 2(x^2 - 2x + 1) + 1 - 2 = 2(x-1)^2 - 1$$

7. Section 1.1: 2, 3, 7, 9, 25, 27-30, 31, 33, 38, 49, 53, 55, 69-70

8. Section 1.3: 3, 5, 7, 9, 15, 21, 28, 30, 33, 35, 37, 39, 41, 43, 47, 50, 51

   In Section 1.3, pay particular attention to *function composition* and function notation. For example, given a formula for $f(x)$, be able to write (and simplify) an expression for something like $f(a+h) - f(a-h)$