MATH 1005: College Algebra
Spring 2019 – March 1
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Answer Key
Quiz 5 – 1.7, 2.1, 2.2, & 2.3
Total: 25 / 25

*Show **all** of your work in the space provided. Clearly indicate your final answer.*

1. Solve $|2x-3|-7 \geq 10$, writing your final answer in interval notation. 4 / 4

> **Solution:** First we get the "absolute value stuff" by itself: $|2x-3| \geq 17$. Since this is a great**OR** than or equal to, we turn the problem into an "or" statement.
>
> $$\begin{aligned} 2x-3 &\geq 17 & &\text{or} & 2x-3 &\leq -17 \\ 2x &\geq 20 & &\text{or} & 2x &\leq -14 \\ x &\geq 10 & &\text{or} & x &\leq -7 \end{aligned}$$
>
> $$[10,\infty)\cup(-\infty,-7]$$

2. Find the distance between the points $(2,-2)$ and $(0,4)$. 3 / 3

> **Solution:** This is a direct application of the distance formula:
>
> $$\begin{aligned} d((2,-2),(0,4)) = \sqrt{(2-0)^2+(-2-4)^2} &= \sqrt{4+36} \\ &= \sqrt{40} \\ &= \sqrt{4\cdot 10} \\ &= \sqrt{4}\cdot\sqrt{10} \\ &= 2\sqrt{10}. \end{aligned}$$

3. Determine if the following three points are collinear: $(4,-2),(-2,8),(1,3)$. 4 / 4

> **Solution:** To determine if three points are collinear, we compute the distances between every pair of points, and then see if any two of the distances

found add up to the third. We have

$$\begin{aligned} d((4,-2),(-2,8)) &= \sqrt{136} = 2\sqrt{34} \\ d((4,-2),(1,3)) &= \sqrt{34} \\ d((-2,8),(1,3)) &= \sqrt{34}, \end{aligned}$$

so the given points are collinear, since the sum of the last two distances equals the first distance.

4. Without sketching the graph, find the x-intercepts and y-intercepts of the graph of the equation $4x + 5y = 60$. 2 / 2

Solution: The y intercept(s) occur where $x = 0$, and vice versa. So

$$\begin{aligned} 4(0) + 5y &= 60 \\ 5y &= 60 \\ y &= 12 \end{aligned}$$

Hence our y-intercept is $y = 12$. Plugging in $y = 0$, we get that our x intercept is $x = 15$.

5. Give the equation of the circle with center $(-2, 5)$ and radius 9. 2 / 2

Solution: $(x + 2)^2 + (y - 5)^2 = 81$.

6. Find the center and radius of the circle given by the equation 4 / 4

$$x^2 + y^2 + 4x - 6y - 12 = 0.$$

Solution: We have to complete the square for both $x^2 + 4x$ and $y^2 - 6y$:

$$\begin{aligned} x^2 + y^2 + 4x - 6y - 12 &= 0 \\ x^2 + 4x + y^2 - 6y &= 12 \\ x^2 + 4x + \left(\frac{4}{2}\right)^2 + y^2 - 6y + \left(\frac{-6}{2}\right)^2 &= 12 + \left(\frac{4}{2}\right)^2 + \left(\frac{-6}{2}\right)^2 \\ (x+2)^2 + (y-3)^2 &= 12 + 4 + 9 \\ (x+2)^2 + (y-3)^2 &= 25. \end{aligned}$$

So the center of the circle is $(-2, 3)$, and the radius is $\sqrt{25} = 5$.

7. Find the slope of the line between the two points $(2, 3)$ and $(-1, 5)$. 2 / 2

Solution: Slope formula:

$$m = \frac{5-3}{-1-2} = \frac{2}{-3} = -\frac{2}{3}.$$

8. Give the equation of the line that passes through the point $(-4, 3)$, and is perpendicular to a line which contains the points $(0, 2), (1, 4)$. 4 / 4

Solution: The line we want is perpendicular to a line containing the points $(0, 2), (1, 4)$. So we need to find the slope of the "other line" first.

$$\frac{4-2}{1-0} = 2.$$

Hence the line we want has slope $-\frac{1}{2}$. We also know that the line we want contains the point $(-4, 3)$. So, our line has equation

$$\begin{aligned} y - 3 &= -\frac{1}{2}(x - (-4)) \\ y - 3 &= -\frac{1}{2}(x + 4) \\ y - 3 &= -\frac{1}{2}x - 2 \\ y &= -\frac{1}{2}x + 1 \end{aligned}$$