MATH 1005: College Algebra
Spring 2019 – March 29
Mr. Nicholas Camacho

**Answer Key**
Quiz 7 – 2.8, 3.1, 3.2, & 3.3
Total: 25 / 25

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

1. Let $f(x) = \dfrac{5}{x}$ and $g(x) = \dfrac{5}{x+1}$. Find $(f \circ g)(x)$, and find the domain of $f \circ g$. 4 / 4

**Solution:**

$$(f \circ g)(x) = f(g(x)) = f\left(\frac{5}{x+1}\right) = \frac{5}{\frac{5}{x+1}} = \frac{5}{1} \cdot \frac{x+1}{5} = x+1.$$

The domain of the function $f \circ g$ is the domain of $g$ intersected with the domain of $x+1$:

$$\begin{aligned}(\text{domain of } g) \cap (\text{domain of } x+1) &= ((-\infty,-1) \cup (-1,\infty)) \cap (-\infty,\infty) \\ &= (-\infty,-1) \cup (-1,\infty)\end{aligned}$$

2. Express the function $H$ as the composition of two functions $f$ and $g$ such that $H(x) = (f \circ g)(x)$, where $H(x) = \sqrt{x+7}$. 3 / 3

**Solution:** Let $f(x) = \sqrt{x}$ and let $g(x) = x+7$. Then

$$H(x) = (f \circ g)(x) = f(g(x)) = f\,(x+7) = \sqrt{x+7}.$$

3. Find the quadratic function $f$ that has vertex $(3,4)$ and passes through the point $(2,6)$. 3 / 3

**Solution:** The standard form of a quadratic equation is $f(x) = a(x-h)^2+k$, where $(h,k)$ is the vertex. So

$$f(x) = a(x-3)^2 + 4.$$

Now we need to find $a$. Since we know that the point $(2,6)$ is on the graph of the function, this means $f(2) = 6$. So

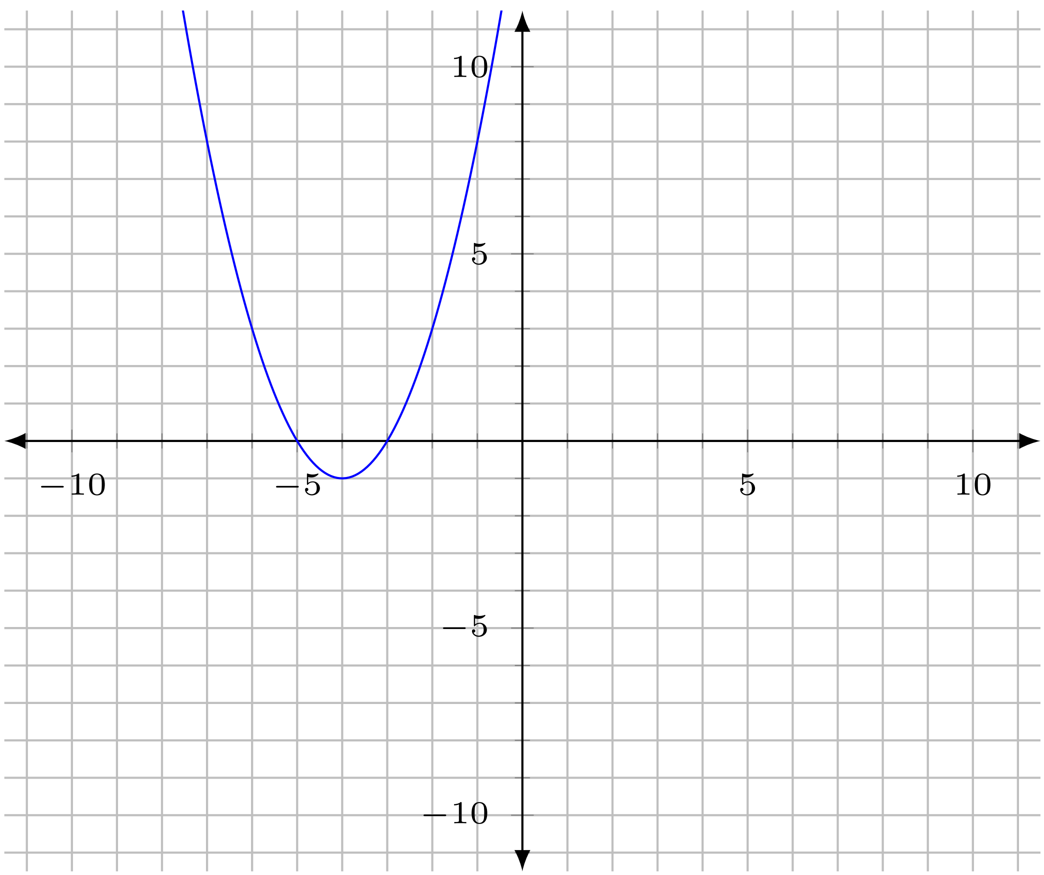
$$6 = f(2) = a(2-3)^2 + 4 = a(-1)^2 + 4 = a + 4.$$

Hence $a + 4 = 6$, with means $a = 2$. Therefore, we have $f(x) = 2(x-3)^2 + 4$.

4. Write the quadratic function $f(x) = x^2 + 8x + 15$ in standard form, and then graph $f(x)$ *without* using an $xy$-table. 5 / 5

**Solution:**

$$\begin{aligned} f(x) &= x^2 + 8x + 15 \\ &= x^2 + 8x + \left(\frac{8}{2}\right)^2 - \left(\frac{8}{2}\right)^2 + 15 \\ &= x^2 + 8x + 16 - 16 + 15 \\ &= (x+4)^2 - 16 + 15 \\ &= (x+4)^2 - 1. \end{aligned}$$




5. Describe the end behavior of the polynomial function $f$ given by $f(x) = 4x - 2x^3$. 3 / 3

**Solution:** The leading term of the polynomial is $-2x^3$. Hence the graph of $f$ has end behavior "like" that of the function $-x^3$. So

$$f(x) \to \infty \text{ as } x \to -\infty$$
$$f(x) \to -\infty \text{ as } x \to \infty.$$

6. Use long division to find the quotient and remainder: 4 / 4

$$\frac{32x^2 - 28x - 15}{8x + 3}$$

**Solution:**

$$\begin{array}{r|l} & 4x \quad -5 \\ \hline 8x+3 & 32x^2 - 28x - 15 \\ & -32x^2 - 12x \\ \hline & \quad -40x - 15 \\ & \quad\ \ 40x + 15 \\ \hline & \qquad\qquad 0 \end{array}$$

So, $\frac{32x^2-28x-15}{8x+3} = 4x - 5$.

7. Use synthetic division 3 / 3

$$\frac{2x^3 + 2x^2 - 3x + 5}{x + 4}$$

**Solution:**

$$\begin{array}{r|rrrr} & 2 & 2 & -3 & 5 \\ -4 & & -8 & 24 & -84 \\ \hline & 2 & -6 & 21 & -79 \end{array}$$

So,

$$\frac{2x^3 + 2x^2 - 3x + 5}{x + 4} = 2x^2 - 6x + 21 - \frac{79}{x + 4}.$$