

# Midterm Exam

## College Algebra

**True or False? No work necessary.**

1.  $-5 = (x - 7)^{300}$
2.  $3^{-2} \in \mathbb{Q}$
3. Range of possible outputs of  $x^8$  is  $\mathbb{R}$
4.  $x^2 + 2$  is  $x^2$  shifted to the right 2
5.  $z^2 * 2x * \frac{5}{2}y * 34 = (34 * 2x) * \frac{5}{2} * (y * z^2)$

**State thought process and justification.**

$$\begin{aligned}f(x) &= x^2 + 3 \\h(x) &= 2x\end{aligned}$$

6. Find all solutions to  $h(x) = 2x + 129$
7. What's the domain of  $\frac{f(x)}{h(x-2)}$ ?
8. Expand  $(x - 7)^2$
9. Graph  $x^2 - 14x + 55$
10. Find the number of solutions to  $2.5x^{98} - 12\pi = 0$ .
11. What is the minimum of  $f(x - 8)$ ? Where does the minimum occur?
12. Find all solutions to  $(x - 20)(x^2 - 9) = 0$ .

## Solutions

1. F
2. T
3. F
4. F
5. T
6. No solutions as the lines are parallel.
7. The function is

$$\frac{x^2 + 3}{2(x - 2)}$$

The only operation with a restriction is division by zero. Therefore, possible inputs are all real numbers except  $x = 2$ .

8. By definition of exponents,

$$\begin{aligned}(x - 7)^2 &= (x - 7)(x - 7) \\ &= x^2 - 14x + 49 \text{ by distribution.}\end{aligned}$$

9. By problem 8 and associativity of addition,

$$\begin{aligned}x^2 - 14x + 55 \\ &= (x^2 - 14x + 49) + 6 \\ &= (x - 7)^2 + 6\end{aligned}$$

Therefore, the graph is that of  $x^2$  shifted up 6 and right 7.

10. The graph of  $x^{98}$  is shaped like  $x^2$ .  
Shifting the function down by  $12\pi$  implies the function will intersect the x-axis twice.

Thus, there are two solutions.

11. The function is

$$f(x - 8) = (x - 8)^2 + 3$$

Therefore, the minimum is 3 and occurs at  $x = 8$ .

12. By the zero product property,

$$x - 20 = 0$$

or

$$x^2 - 9 = 0$$

Therefore,  $x = 20$  or  $x = 3$  or  $x = -3$ .