Date Completed: _____
Mentor Initials: _____

Calculator

Note: Use a graphing calculator for ALL questions.

1. If $x = \frac{4}{5} + \frac{5}{4}$, $y = \frac{4}{3} + \frac{3}{4}$, and $z = 1 + 1$, which of the following orders $x, y,$ and z from least to greatest?

A. $x < y < z$
B. $y < z < x$
C. $y < x < z$
D. $z < x < y$
E. $z < y < x$

2. Which of the following matrices is equal to $\begin{bmatrix} -6 & 7 \\ 8 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 3 \\ -4 & 6 \end{bmatrix}$?

A. $\begin{bmatrix} -1 & 10 \\ 4 & 10 \end{bmatrix}$
B. $\begin{bmatrix} -1 & 10 \\ 12 & 10 \end{bmatrix}$
C. $\begin{bmatrix} 11 & 10 \\ 12 & 10 \end{bmatrix}$
D. $\begin{bmatrix} 1 & 8 \\ 12 & 2 \end{bmatrix}$
E. $\begin{bmatrix} 11 & 4 \\ -10 & -4 \end{bmatrix}$

3. When $\log_6 x = -2$, what is x ?

A. -48
B. -36
C. -12
D. $\frac{1}{12}$
E. $\frac{1}{36}$

4. If $x = -2$ and $y = -1$, what is the value of $y^3 - y^2x - 2yx^2 + 4$?

A. -7
B. -3
C. 9
D. 13
E. 24

5. Which of the following expressions represents the sum of 4.8×10^7 and 5.6×10^6 in scientific notation?

A. 1.04×10^{14}

B. 5.36×10^6

C. 5.36×10^7

D. 10.4×10^{42}

E. 53.6×10^6

6. For $i^2 = -1$, $(i-4)^2 =$

A. -17

B. $-8i + 15$

C. $8i - 15$

D. 15

E. 16

7. The fifth power of a number is 229,345,007. The number is between:

A. 1 and 10.

B. 10 and 100.

C. 100 and 1,000.

D. 1,000 and 100,000.

E. 100,000 and 100,000,000.

8. Which one of the following inequalities is true?

A. $4 < \sqrt{5} < 6$

B. $\frac{2}{3} < \sqrt{\frac{2}{5}} < \frac{2}{7}$

C. $2 < 2(\sqrt{3}) < 3$

D. $\sqrt{5} < 6 < \sqrt{7}$

E. $\sqrt{3} < 2(\sqrt{3}) < 4$

9. What is the value of $|-8| - |8 - 26|$?

A. -26

B. -10

C. 10

D. 26

E. 42

10. For all $x > 0$, which of the following expressions is equivalent to $\frac{i}{9-i}$?

A. $-\frac{1}{9}$

B. $\frac{1}{9}$

C. $\frac{1}{81} + \frac{1}{9}i$

D. $\frac{1}{82} + \frac{9}{82}i$

E. $-\frac{1}{82} + \frac{9}{82}i$

11. Which of the following operations will produce the largest result when substituted for the blank in the expression 53 ____ $(-\frac{1}{55})$?

A. Averaged with
B. Divided by
C. Minus
D. Plus
E. Multiplied by

12. In the standard (x, y) coordinate plane, given Parabola A with equation $y = 2x^2$, Parabola B is the image of Parabola A after a shift of 6 coordinate units to the left and 5 coordinate units down. Parabola B has which of the following equations?

A. $y = 2(x-5)^2 - 6$
B. $y = 2(x-6)^2 - 5$
C. $y = 2(x-6)^2 + 5$
D. $y = 2(x+6)^2 - 5$
E. $y = 2(x+5)^2 + 6$

13. The number $0.000\ 000\ 000\ 009\ 64$ is equivalent to which of the following expressions?

A. 9.64×10^{-12}

B. 9.64×10^{-10}
C. 9.64×10^{-9}
D. $9.64. \times 10^{10}$
E. 9.64×10^{12}

14. The statement $4x - (x + 6) + 7 = 3x + 13$ is true for:

A. $x = 0$ only.
B. $x = 6$ only.
C. $x = 8$ only.
D. no values of x.
E. all values of x.

15. Given $A = \begin{bmatrix} 1 & 2 \\ 5 & -3 \\ 4 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 5 & 7 \\ 3 & 0 & -1 \end{bmatrix}$, and $C = \begin{bmatrix} -5 & 3 \\ 1 & 7 \end{bmatrix}$, if it is possible to calculate $BA + C$, which of the following matrices is the result?

A. $\begin{bmatrix} 59 & -3 \\ -1 & 6 \end{bmatrix}$

B. $\begin{bmatrix} 54 & 0 \\ 0 & 13 \end{bmatrix}$

C. $\begin{bmatrix} 64 & -6 \\ -2 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 12 & 5 & 5 \\ 21 & 25 & 38 \\ 24 & 20 & 28 \end{bmatrix}$

E. It is not possible to calculate $BA + C$.

16. The solution set of the equation $|x - 2| = x - 2$ is the set of all values of x such that:

A. $x \geq 2$
B. $x \leq 2$
C. $x \geq 1$
D. $x \leq 1$
E. x is a real number

17. What is the set of real solutions for $|x|^2 - 2|x| - 3 = 0$?

A. $\{3\}$

B. $\{-3,\ 3\}$

C. $\{-1,\ 3\}$

D. $\{1, -3\}$

E. $\{-3, -1,\ 1,\ 3\}$

18. Which of the following is the solution set of $27^{x^2} = 9^{-5x-4}$?

A. $\{-4, -\frac{2}{3}\}$

B. $\{-1, -\frac{8}{3}\}$

C. $\{-\frac{4}{3}, -2\}$

D. $\{1, 4\}$

E. $\{\frac{4}{3}, 2\}$

19. What real value of x satisfies the equation $\log_4 16^3 = 3x$?

A. 2
B. 4
C. 6
D. 16
E. 256