1) Find the midpoint of the line segment shown on the graphing utility.

A) (-1, 8)  B) (\frac{9}{2}, 2)  C) (-9, 4)  D) (-\frac{9}{2}, 2)

2) A middle school's baseball playing field is a square, 55 feet on a side. How far is it directly from home plate to second base (the diagonal of the square)? If necessary, round to the nearest foot.

A) 77 feet  B) 78 feet  C) 79 feet  D) 85 feet

3) Solve: \[ \frac{5x + 3}{2} + \frac{5}{2} = -\frac{7x}{6} \]

A) \{-3\}  B) \{-\frac{3}{11}\}  C) \{\frac{3}{11}\}  D) \{-\frac{12}{11}\}

4) Solve for x: \[ \frac{x}{2x + 2} = \frac{2x - 3}{x + 1} - \frac{2x}{4x + 4} \]

A) \{3\}  B) \{-3\}  C) \{\frac{3}{2}\}  D) no solution

5) Solve for x: \[ ax - b = c, \ a \neq 0 \] The letters a, b, and c are constants.

A) \[ x = \frac{b + c}{a} \]  B) \[ x = -\frac{b + c}{a} \]  C) \[ x = \frac{c - b}{a} \]  D) \[ x = \frac{b - c}{a} \]

6) Find the real solutions of the equation \[ 3x - 26 = \frac{9}{x} \]

A) \{\frac{1}{26}, -\frac{1}{3}\}  B) \{-\frac{1}{3}, 9\}  C) \{-\frac{1}{3}, 3\}  D) \{-3, 9\}
7) Write $\frac{6 + 9i}{7 - 3i}$ in the standard form $a + bi$.

A) $\frac{69}{40} - \frac{81}{40}i$

B) $\frac{15}{58} + \frac{81}{58}i$

C) $\frac{69}{58} - \frac{45}{58}i$

D) $\frac{3}{8} - \frac{81}{40}i$

8) Solve: $x^2 + x + 3 = 0$

A) $\left\{ -\frac{1}{2}, \frac{1}{2} \right\}$

B) $\left\{ \frac{1}{2} + \frac{\sqrt{11}}{2}i, \frac{1}{2} - \frac{\sqrt{11}}{2}i \right\}$

C) $\left\{ \frac{1}{2} - \frac{\sqrt{11}}{2}i, \frac{1}{2} + \frac{\sqrt{11}}{2}i \right\}$

D) $\left\{ \frac{-1}{2} - \frac{\sqrt{11}}{2}i, \frac{-1}{2} + \frac{\sqrt{11}}{2}i \right\}$

9) Solve: $|u - 3| = -\frac{1}{2}$

A) $\left\{ \frac{5}{2} \right\}$

B) $\left\{ \frac{7}{2} \right\}$

C) $\left\{ \frac{5}{2}, \frac{7}{2} \right\}$

D) no real solution

10) Solve: $|3k - 7| - 5 > 4$. Express your answer using interval notation.

A) $(-\infty, -\frac{2}{3}) \cup \left[ \frac{16}{3}, \infty \right)$

B) $(-\infty, -\frac{2}{3}) \cup \left( \frac{16}{3}, \infty \right)$

C) $\left( \frac{16}{3}, \infty \right)$

D) $(-\frac{2}{3}, \frac{16}{3})$

11) Find an equation for the line that contains the point (2, -10) and is parallel to the line $5x + 7y = -25$.

A) $2x + 7y = -25$

B) $7x + 5y = -10$

C) $5x - 7y = -60$

D) $5x + 7y = -60$

12) Find the domain of the function $f(x) = \sqrt{10 - x}$.

A) $\{ x | x \leq \sqrt{10} \}$

B) $\{ x | x \neq 10 \}$

C) $\{ x | x \neq \sqrt{10} \}$

D) $\{ x | x \leq 10 \}$
13) Write the standard form of the equation of the circle shown.

A) \((x - 4)^2 + (y - 1)^2 = 36\)  
B) \((x - 1)^2 + (y - 4)^2 = 36\)

C) \((x + 4)^2 + (y + 1)^2 = 36\)  
D) \((x + 1)^2 + (y + 4)^2 = 36\)

14) Tell whether the graph is symmetric with respect to the x-axis, y-axis, origin, or none of these.

A) symmetric to origin  
B) symmetric to origin, x-axis, and y-axis

C) symmetric to y-axis  
D) symmetric to x-axis

15) Find and simplify the difference quotient \(\frac{f(x + h) - f(x)}{h}\), \(h \neq 0\), for the function \(f(x) = 9x + 7\).

A) 9  
B) \(9 + \frac{14}{h}\)

C) 0  
D) \(9 + \frac{18(x + 7)}{h}\)
16) Find the vertical asymptotes of the rational function \( f(x) = \frac{-x^2 + 16}{x^2 + 5x + 4} \).

A) \( x = -1 \)  
B) \( x = 1, x = -4 \)  
C) \( x = -1, x = 4 \)  
D) \( x = -1, x = -4 \)

17) The profit that a vendor makes per day by selling \( x \) pretzels is given by the function 
\[ P(x) = -0.002x^2 + 1.6x - 50. \] 
Find the number of pretzels that must be sold to maximize profit.

A) 0.8 pretzels  
B) 270 pretzels  
C) 800 pretzels  
D) 400 pretzels

18) The graph of a function \( f \) is given. Find the numbers, if any, at which \( f \) has a local maximum. What are the local maxima?

A) \( f \) has a local maximum at \( x = 2 \); the local maximum is 2
B) \( f \) has a local maximum at \( x = -2 \) and 2; the local maximum is 0
C) \( f \) has a local maximum at \( x = 0 \); the local maximum is 2
D) \( f \) has no local maximum
19) The graph of a function \( f \) is given. Find the intervals on which \( f \) is increasing, decreasing, or constant.

A) Increasing on \( (-\pi, -\pi/2) \) and \( (\pi/2, \pi) \); decreasing on \( (-\pi/2, \pi/2) \)

B) Decreasing on \( (-\pi, -\pi/2) \) and \( (\pi/2, \pi) \); increasing on \( (-\pi/2, \pi/2) \)

C) Increasing on \( (-\infty, \infty) \)

D) Decreasing on \( (-\pi, 0) \); increasing on \( (0, \pi) \)

20) The graph of a function \( f \) is given. For what numbers \( x \) is \( f(x) > 0? \)

A) \( (-\infty, -60) \)

B) \( (-60, 70) \)

C) \( [-100, -60), (70, 100) \)

D) \( (-60, \infty) \)
21) The graph of a piecewise-defined function is given. Choose a definition for the function.

\[
A) f(x) = \begin{cases} 
\frac{3}{4}x + 4 & \text{if } -3 \leq x \leq 0 \\
\frac{3}{2}x & \text{if } x \geq 0 \\
\frac{4}{3}x + 4 & \text{if } -3 \leq x \leq 0 \\
\frac{2}{3}x & \text{if } x > 0 
\end{cases}
\]

\[
B) f(x) = \begin{cases} 
\frac{3}{4}x + 4 & \text{if } -3 \leq x \leq 0 \\
\frac{3}{2}x & \text{if } x > 0 \\
\frac{4}{3}x + 4 & \text{if } -3 \leq x \leq 0 \\
\frac{2}{3}x & \text{if } 0 < x \leq 3 
\end{cases}
\]

22) Find the function that is finally graphed after the following transformations are applied to the graph of \( y = |x| \). The graph is shifted right 3 units, stretched by a factor of 3, shifted vertically down 2 units, and finally reflected across the x-axis.

A) \( y = 3|x - 3| - 2 \) 
B) \( y = -(3|x + 3| - 2) \) 
C) \( y = -(3|x - 3| - 2) \) 
D) \( y = -3|x - 3| - 2 \)

Solve the inequality.

23) Solve: \( x(x + 3)(5 - x) \geq 0 \). Express your answer using interval notation.

A) [-3, 0] or [5, \( \infty \)] 
B) (-\( \infty \), -3] or [0, 5] 
C) [-3, 5] 
D) [0, 5]

24) Solve: \( \frac{x - 5}{x + 6} < 1 \). Express your answer using interval notation.

A) (-6, 5) 
B) (-\( \infty \), -6) 
C) (-\( \infty \), -6) or (5, \( \infty \)) 
D) (-6, \( \infty \))
25) List the potential rational zeros of the polynomial function \( f(x) = 7x^3 - kx^2 + 3 \). k is an integer.

A) \( \pm \frac{1}{3}, \pm \frac{7}{3}, \pm 1, \pm 7 \)
B) \( \pm \frac{1}{7}, \pm \frac{3}{7}, \pm 1, \pm 3 \)
C) \( \pm \frac{1}{7}, \pm \frac{1}{3}, \pm 1, \pm 3, \pm 7 \)
D) \( \pm \frac{1}{7}, \pm \frac{3}{7}, \pm 1, \pm 3, \pm 7 \)

26) Find the inverse of the function \( f(x) = \frac{4x + 5}{3} \)

A) \( f^{-1}(x) = \frac{3}{4x + 5} \)
B) \( f^{-1}(x) = \frac{3x + 5}{4} \)
C) \( f^{-1}(x) = \frac{3x - 5}{4} \)
D) \( f^{-1}(x) = \frac{3}{4x - 5} \)

27) Solve: \( 2^{(11 - 3x)} = 32 \)

A) \{1\}  
B) \{3\}  
C) \{-2\}  
D) \{2\}

28) The height in meters of girls of a certain tribe is approximated by \( h = 0.52 + 2 \log \left( \frac{t}{3} \right) \) where \( t \) is the girl's age in years and \( 1 \leq t \leq 20 \). Estimate the height (to the nearest hundredth of a meter) of a girl of the tribe 4 years of age.

A) 1.12 m  
B) 0.77 m  
C) 0.96 m  
D) 0.52 m

29) Solve: \( \log_x \left( \frac{16}{9} \right) = 2 \)

A) \( \left\{ \frac{4}{3} \right\} \)  
B) \( \{2\} \)  
C) \( \{16\} \)  
D) \( \left\{ \frac{3}{4} \right\} \)

30) Express as a single logarithm: \( (\log_a t - \log_a s) + 6 \log_a u \)

A) \( \log_a \frac{tu^6}{s} \)  
B) \( \log_a \frac{6tu}{s} \)  
C) \( \log_a \frac{t}{u6s} \)  
D) \( \log_a tu^6s \)
31) Use the Change-of-Base Formula and a calculator to evaluate \( \log_6 10.86 \). Round your answer to three decimal places.

A) 0.751  B) 1.331  C) 1.036  D) 1.810

32) A tour group split into two groups when waiting in line for food at a fast food counter. The first group bought 7 slices of pizza and 6 soft drinks for $36.33. The second group bought 6 slices of pizza and 5 soft drinks for $30.93. How much does one slice of pizza cost?

A) $3.43 per slice of pizza  B) $1.47 per slice of pizza  
C) $1.97 per slice of pizza  D) $3.93 per slice of pizza

\[
\begin{align*}
 x - y + z &= 8 \\
 x + y + z &= 6 \\
 x + y - z &= -12
\end{align*}
\]

33) Solve the system of equations for \( z \):

A) \( z = -9 \)  B) \( z = -2 \)  C) \( z = 9 \)  D) \( z = -1 \)

34) Write out the first five terms of the sequence.

\[
\left\{ \frac{n}{n^2 + 2} \right\}
\]

A) \( \frac{1}{3}, \frac{1}{3}, \frac{3}{8}, \frac{2}{5}, \frac{5}{12} \)  B) \( \frac{1}{4}, \frac{1}{3}, \frac{3}{8}, \frac{2}{5}, \frac{5}{12} \)  
C) \( \frac{1}{2}, \frac{1}{3}, \frac{3}{8}, \frac{2}{5}, \frac{5}{12} \)  D) \( \frac{1}{3}, \frac{1}{3}, \frac{3}{11}, \frac{2}{9}, \frac{5}{27} \)

35) Show all work on the answer sheet.

Find the polynomial with real coefficients that has roots of 3 and -4i

36) Show all work on the answer sheet.

Solve for \( x \) algebraically: \( x^3 - x^2 - 4x - 6 = 0 \)

37) Show all work on the answer sheet.

Given \( f(x) = x^2 + 1 \) and \( g(x) = x - 2 \), find:

a) \( (f \circ g)(x) \)

b) \( (f \circ g)(-4) \)