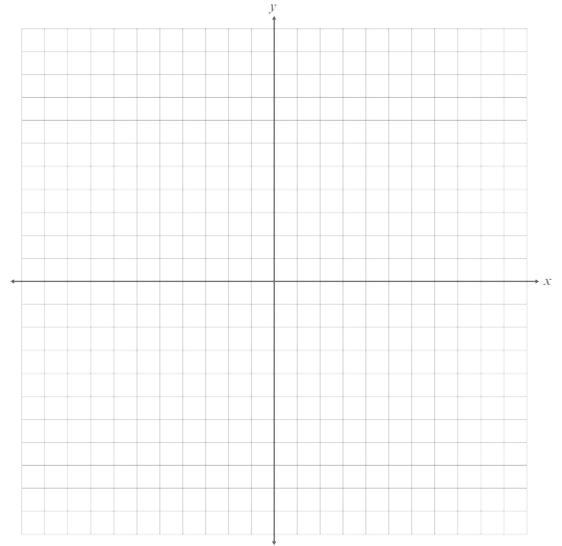


Algebra 2 Midterm (Units 1–3)

1) Complete each part of the problem.

A) Graph:

$$f(x) = \begin{cases} (x+6)^3 + 2 & \text{when } x \leq -5 \\ -\sqrt{(x+4)} - 3 & \text{when } -4 < x \leq 5 \end{cases}$$



B) Name the types of graphs and the domain and range from the piecewise function.

C) Algebraically determine the inverse to each expression in the piecewise function.

D) Explain whether or not the inverse of $f(x)$ will also be a function.

2) Complete each part of the problem.

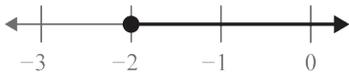
A) Write the quadratic equation in standard form containing the points $(0, 13)$, $(-1, 28)$, $(2.5, 1.75)$.

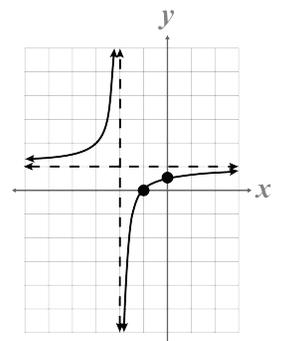
B) Calculate the x -intercepts of the parabola using the equation from part A. Write the answer in simplified radical form.

C) Write the quadratic equation from part A in vertex form.

D) Describe the transformation of the quadratic equation from its parent equation.

Multiple Choice

- ___ 3) When a region is unbounded for linear programming, it means:
- A)** the region will not be completely enclosed and will continue infinitely in at least one direction.
- B)** the region does not exist.
- C)** the region will be enclosed in all directions.
- D)** nothing is known about the problem.
- ___ 4) Determine the expression that, when set equal to $(ax)^3 + (by)^3$, would form a polynomial identity.
- A)** $(ax + by)((ax)^2 - abxy - (by)^2)$
- B)** $(ax + by)((ax)^2 - abxy + (by)^2)$
- C)** $(ax + by)(ax^2 - abxy + by^2)$
- D)** $(ax - by)((ax)^2 + 2abxy + (by)^2)$
- ___ 5) State the restrictions on the denominator: $\frac{6x^2 + 7x + 2}{2x^2 - 5x - 12} \div \frac{3x + 2}{3x + 12}$
- A)** $x \neq -\frac{3}{2}, -\frac{2}{3}, 4$
- B)** $x \neq \pm 4, \frac{2}{3}, \frac{3}{2}$
- C)** $x \neq -\frac{3}{2}, \pm 4$
- D)** $x \neq -\frac{3}{2}, -\frac{2}{3}, \pm 4$
- ___ 6) Solve: $\sqrt{4x + 8} - 6 \leq 2$
- A)** 
- B)** 
- C)** 
- D)** 
- ___ 7) Select the equation that best matches the graph.
- A)** $y = \frac{1}{x+2} + 1$
- B)** $y = \frac{1}{x-2} + 1$
- C)** $y = -\frac{1}{x+2} + 1$
- D)** $y = -\frac{1}{x-2} + 1$



___ 8) Simplify: $\frac{-2i}{4-5i}$

A) $\frac{10-8i}{41}$

B) $\frac{10+8i}{9}$

C) $\frac{-2i}{41}$

D) $\frac{10-8i}{-9}$

___ 9) Determine the classification of the solutions to the quadratic equation: $-x^2 + 5x - 7 = 0$

A) Two rational solutions

B) One rational solution

C) Two complex solutions

D) No solution

___ 10) Calculate the distance between $(5, -2)$ and $(-7, -4)$.

A) 6.3

B) 11.8

C) 12.2

D) 148

___ 11) Divide $2x^3 - 3x^2 - 7x + 2$ by $x^2 - 3x + 1$.

A) $2x - 9 + \frac{22x - 6}{x^2 - 3x + 1}$

B) $2x + 3$

C) $2x + 3 - \frac{18x + 6}{x^2 - 3x + 1}$

D) $x - 32$

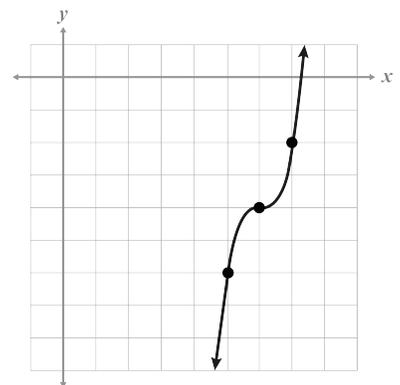
___ 12) Select the equation that best matches the graph.

A) $y = 2\sqrt[3]{x+6} - 4$

B) $y = 2(x+6)^3 - 4$

C) $y = 2\sqrt[3]{x-6} - 4$

D) $y = 2(x-6)^3 - 4$



___ 13) Solve: $(x+5)^{\frac{2}{3}} - 7 = -3$

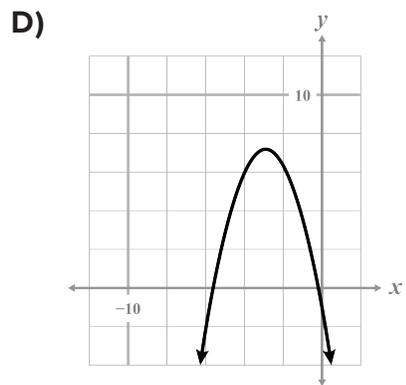
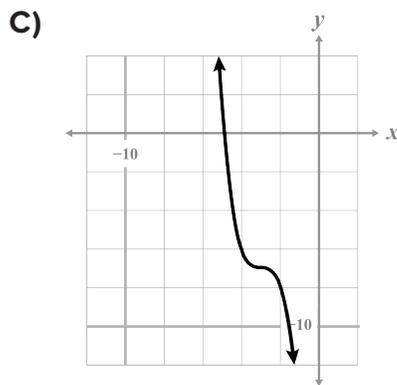
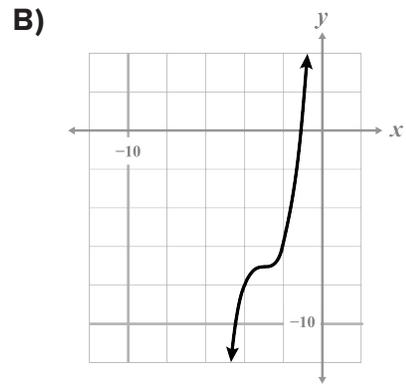
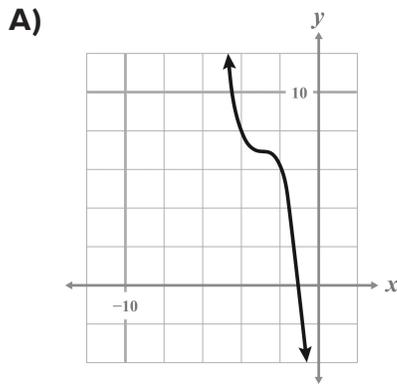
A) 3

B) ± 3

C) -13, 3

D) 61

___ 14) Select the graph that represents the inverse of the function: $j(x) = \sqrt[3]{7-x} - 3$



___ 15) Select the parabola in the form $x = y^2$, reflected over the y-axis and translated right eight spaces.

A) $x = -y^2 + 8$

B) $x = -(y + 8)^2$

C) $x = -(y - 8)^2$

D) $x = -y^2 - 8$

___ 16) Solve the system. Then calculate the product of x and the sum of y and z for the system:

$$2x - 3y - 3z = 22$$

$$2x + y + z = 14$$

A) 16

B) 8

C) -16

D) -2

_____ 17) Determine the system that best represents the graph.

A) $y = |x + 5| - 3$

$y = -\sqrt{x+4}$

B) $y < |x + 5| - 3$

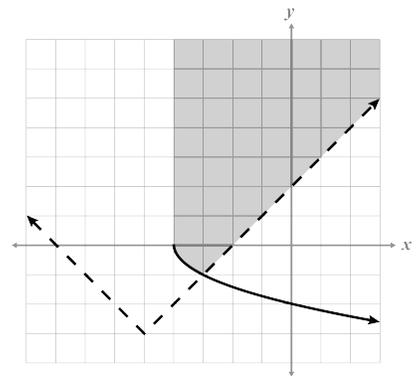
$y \geq -\sqrt{x+4}$

C) $y > |x + 5| - 3$

$y \geq \sqrt{-x+4}$

D) $y > |x + 5| - 3$

$y \geq -\sqrt{x+4}$



_____ 18) Write the conic section equation $x^2 - 5y^2 - 10y = 15$ in standard form.

A) $\frac{(x+1)^2}{2} - \frac{y^2}{10} = 1$

B) $\frac{x^2}{10} - \frac{(y+1)^2}{2} = 1$

C) $\frac{(x+1)^2}{10} - \frac{y^2}{2} = 1$

D) $\frac{x^2}{10} + \frac{(y+1)^2}{2} = 1$

_____ 19) Solve: $\frac{x-4}{3x} = \frac{x-1}{x+3} - 1$

A) -12

B) -12, 1

C) 1

D) -1, 12

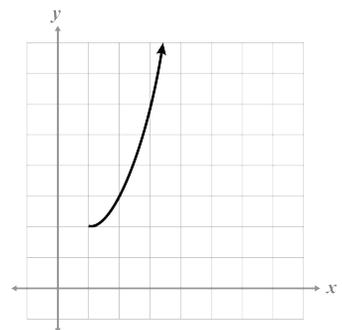
_____ 20) Name the range for the inverse of the graph in interval notation.

A) $[1, \infty)$

B) $[2, \infty)$

C) $(1, \infty)$

D) $(2, \infty)$



_____ 21) The area of a rectangle is $29 - 7\sqrt{17}$ square yards. The length of the rectangle is $4 - \sqrt{17}$ yards. Find the width of the rectangle.

A) $3 + 57\sqrt{17}$

B) $3 + \sqrt{17}$

C) $-29 + 7\sqrt{17}$

D) $3 - \sqrt{17}$

_____ 22) Determine the value of $P(-2)$ if $P(x) = x^4 + 8x^2 + 23x - 6$.

A) $P(-2) = -28$

B) $P(-2) = 80$

C) $P(-2) = 88$

D) $P(-2) = -4$

_____ 28) Factor: $4x^3 - 32y^3$

A) $4(x - 2y)(x^2 + 2xy + 4y^2)$

B) $-4(x + 2y)(x^2 + 2xy + 4y^2)$

C) $4(x - 2y)(x^2 - 2xy + 4y^2)$

D) $4(x + 2y)(x^2 - 2xy + 4y^2)$

_____ 29) Select the rational function with a domain of all real numbers *except* 3 and a range of all real numbers *except* -2.

A) $f(x) = \frac{1}{x+3} - 2$

B) $q(x) = -\frac{3}{x} + 2$

C) $m(x) = \frac{1}{x-3} - 2$

D) $r(x) = \frac{1}{x-3} + 2$

_____ 30) Solve $x^2 + \frac{7}{25} = 0$ under the set of complex numbers.

A) $\frac{\sqrt{7}}{5}$

B) $\frac{\pm\sqrt{7}}{5}$

C) $\frac{\pm i\sqrt{7}}{5}$

D) no solution

_____ 31) Calculate the value of n when $P(2) = -1$ and $P(x) = x^4 - 3x^2 + 4x + n$.

A) -13

B) 8

C) -5

D) 11

Select all that apply.

32) Select the expressions that, when multiplied, will form a polynomial identity to $4x^2(x + 1) - 5(11x + 20)$.

$(x + 1)$

$(x - 4)$

$(2x + 5)^2$

$(11x + 20)$

Select all that apply.

33) The process of completing the square can be used to write the equations for ____ in standard form.

- circle
- ellipse
- parabola
- rational

34) Name all possible roots for the equation: $(4x^2 + 16)(x^2 - 2x - 4) = 0$.

- $\pm 2i$
- $\pm 4i$
- $1 \pm \sqrt{5}$
- $1 \pm i\sqrt{3}$

35) Select all vertices for the solution to the system of inequalities.

- (2, 3)
- (0, 9)
- $\left(2, \frac{2}{3}\right)$
- (3, 0)

