Final Exam Review Algebra 2 2015-2016 Semester 1 **Name:** _____

Module 1

Find the inverse of each function.

1. $f(x)=10-4x$

2. $g(x)=15x-10$

Use compositions to check if the two functions are inverses.

3. $s(x)=7-2x$ and $t(x)=-\frac{1}{2}x+\frac{7}{2}$

4. $h(x)=\frac{1}{3}x+4$ and $j(x)=3x-12$

Find the inverse of each function.

5. $f(x)=5x+10$

6. $f(x)=\frac{9}{2}x-5$

Let $g(x)$ be the transformation of $f(x)$. Write the rule for $g(x)$ using the change described.

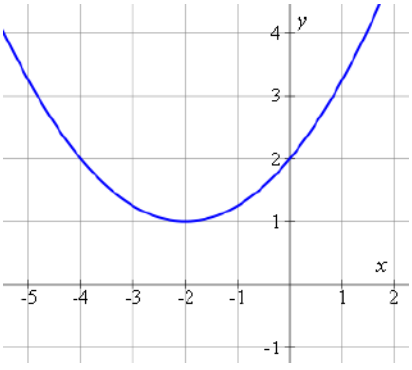
7. reflection across the y-axis followed by a vertical shift up 3 units.

8. horizontal shift right 2 units and a vertical stretch by a factor of 3

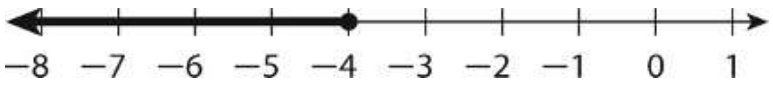
9. vertical compression by a factor of $\frac{1}{8}$ followed by a vertical shift down 6 units

10. reflection across the x-axis, followed by a vertical stretch by a factor of 3, a horizontal shift 6 units left, and a vertical shift 4 units down.

11. Find the equation of the parabola in vertex form ($y=a(x-h)^2+k$).



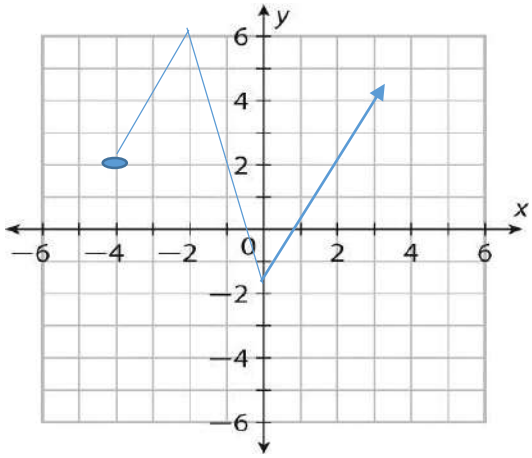
12. Write the given interval in inequality, set, and interval notation.



Inequality: _____ Set Notation: _____

Interval Notation: _____

Use the given graph to answer the following questions #13-15.



13.On which intervals is the function increasing and decreasing?

14. What are the local maximum and global minimum values?

Max: _____ Min: _____

15. What are the zeros of the function?

Module 2

Use the graph below for 1–4.

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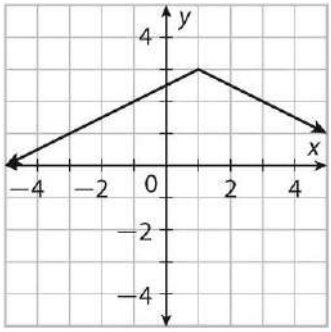
1. Write a function in standard form to match the graph. Let *b* =1.



2. Find the vertex of the function. 3. Find the domain of the function. 4. Find the range of the function.

5. Given that $f(x) = |x - 4| + 3$ determine if each statement is True or False.
   - A The domain is all real numbers.
   - B The vertex is (-4, 3).
   - C The vertex is (4, 3).
   - D The range is all real numbers.

6. If $g(x) = |x + 5|$ write a function *h*(*x*) that is *g*(*x*) translated down 2 units and vertically stretched by a factor of 2.

Module 3

1. Determine if each quadratic equation has real solutions. Choose Yes or No.
   - A. $12x^2 - 5 = -3$ ○ Yes ○ No
   - B. $3x^2 - 1 = 8x^2 + 9$ ○ Yes ○ No
   - C. $4(3x^2 - 7) = 3(x^2 - 5)$ ○ Yes ○ No

2. A tennis ball is hit with an initial vertical velocity of 60 ft/s. The function $h(t) = -16t^2 + 60t + 2$ models the height h (in feet) of the tennis ball at time t (in seconds). Does the ball reach each of the following heights? Choose Yes or No.

A	44 feet	○ Yes	○ No
B	52 feet	○ Yes	○ No
C	60 feet	○ Yes	○ No

3. At what time does the tennis ball reach its maximum height? _____

4. Determine the number and types of solutions for each quadratic equation.

A. $9x^2 + 7x = 6$ Number: ____ Type: _____

B. $3(x^2 - 4) = 2x^2 + 3$ Number: ___ Type: _____

C. $5 + 3x^2 = 7x^2 - 10$ Number: ____ Type: _____

For 5–6, use the quadratic formula to determine the solutions to each equation.

5. $-3x^2 - 7x - 9 = 0$

6. $5x^2 - 9x + 8 = 0$

Module 4

1. Cara and Ellen both take a walk through the park. Cara follows a path modeled by the equation $y = x + 3$. Ellen's path can be modeled by $y = -(x - 3)^2 + 8$. Determine if each of the following is a point where the paths will cross. Choose Yes or No.

A.	(4, 7)	○ Yes	○ No
B.	(2, 5)	○ Yes	○ No
C.	(3, 6)	○ Yes	○ No
D.	(1, 4)	○ Yes	○ No

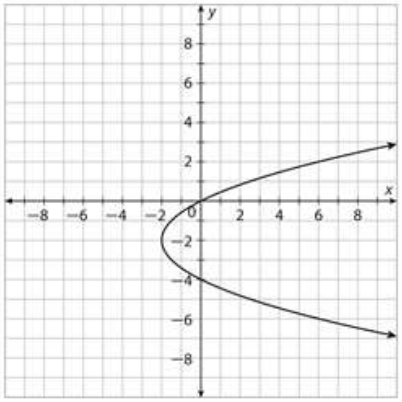
2. What is the equation of a parabola with a vertex at (0, 0), a focus at (4, 0), and a directrix $x = -4$?
3. What is the equation of the parabola with the focus $(-2, 4)$ and the directrix $x = 2$?
4. Find the missing characteristics of the parabola from the given information.
   Focus: (0,7) directrix: y = -7

   Vertex: _____ Opens: _____

   p: _____ Equation: _____

5. Which statement about a parabola is **not** true?
   A. The focus of the parabola lies on the axis of symmetry.
   B. The directrix of the parabola is parallel to the axis of symmetry.
   C. Each point on the parabola is equidistant from the directrix and the focus.

6. Which line intersects the parabola shown below in exactly two points?



$x = -2$

$y = x + 2$

$y = -x - 2$

7. Find the equation of the parabola with the focus (-2, 2) and the directrix $y = 6$

8. Solve the system $\begin{cases} x^2 + y = 16 \\ y + x = 4 \end{cases}$

9. Solve the System $\begin{cases} 8x + y^2 = 12 \\ x + y = 3 \end{cases}$

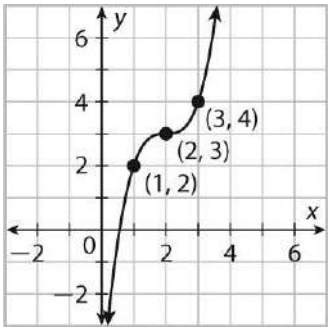
10. The equation for the cross section of a parabolic telescope mirror is $34y = x^2$ measured in centimeters. How far is the focus from the vertex of the cross section?

Module 5

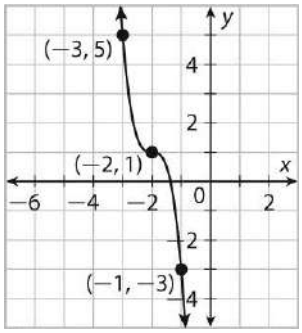
1. Give the coordinates of the transformed reference points if $f(x) = x^3$ is stretched vertically by a factor of 3 and then translated 5 units right and 2 units up.

2. Draw the graph if the function shown is transformed to $g(x) = \frac{1}{4}(x + 5)^3 - 3$. Draw the new curve and give the coordinates of the transformed reference points.

3. Write the equation of the function the graph represents. Use the form $g(x) = a(x - h)^3 + k$.



4. Write the equation of the function the graph represents. Use the form $g(x) = a(x-h)^3 + k$.

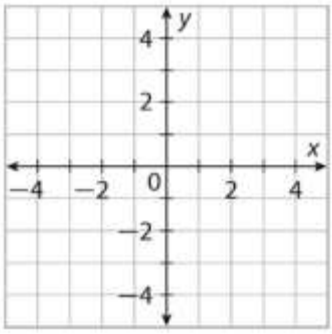


5. Write a function that transforms $f(x) = x^3$ with a vertical stretch by a factor of 3, a left shift of 4 units and a shift up 7 units.

6. Describe how the graph of $g(x) = \frac{1}{2}(x+7)^3 + 4$ is related to the graph of $f(x) = x^3$.

7. Describe how the graph of $g(x) = -64(x-3)^3 - 10$ is related to the graph of $f(x) = x^3$.

8. Sketch the graph of the function $f(x) = x(x-1)^2$ and determine the following.



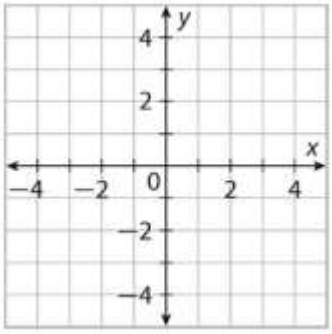
Domain: _____ Range: _____

End Behavior: _____

_____

x-Intercepts: _____

9. Sketch the graph of the function $f(x) = (x+1)(x-2)(x+3)$ and determine the following.



Domain: _____ Range: _____

End Behavior: _____

_____

x-Intercepts: _____

10. Which of the following is a true statement about the graph of $p(x) = x(x-4)(x+2)^2$?

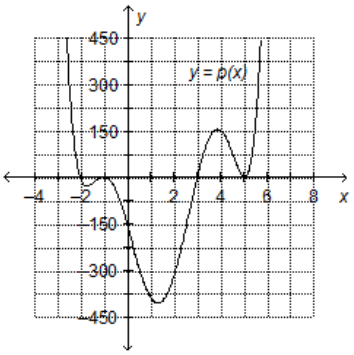
A. The graph crosses the *x*-axis four times and is never tangent to the *x*-axis.

B. The graph crosses the *x*-axis three times and is never tangent to the *x*-axis.

C. The graph crosses the *x*-axis two times and is tangent to the *x*-axis once.

D. The graph crosses the *x*-axis three times and is tangent to the *x*-axis once.

11. Which of the following statements are true about the polynomial function $p(x)$? (The zeros of $p(x)$ are integers, and the graph of $p(x)$ does not cross the x-axis at places other than those shown.)



A. The degree of *p(x)* is even

B. The leading coefficient of *p(x)* is negative

C. *P(x)* has 6 distinct zeroes

D. *P(x)* has a 1 global minimum

For # 12-13, determine the number of turning points and number and type (global or local) of any max/min values.

12. $f(x) = x(x+4)(x-1)$

Turning points: _____

Maximum: _____

Minimum: _____

13. $f(x) = (x-1)^3(x+5)$

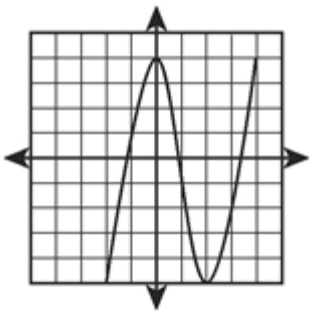
Turning points: _____

Maximum: _____

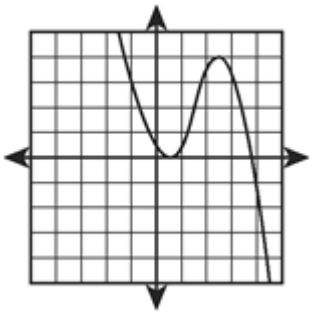
Minimum: _____

14. Which is a graph of an even function with a positive leading coefficient?

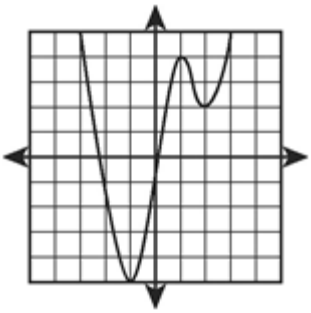
a.



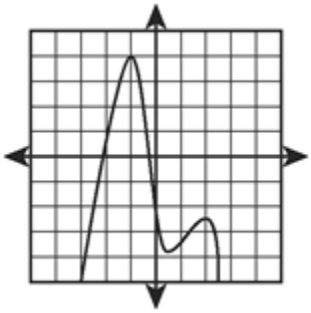
B.



C.



D.



Module 6

1. Does each product result in $\left(a^3+b^3\right)$ when simplified?

A) $(a+b)\left(a^2-ab+b^2\right)$

B) $(a-b)\left(a^2+ab+b^2\right)$

C) $(a+b)(a+b)(a+b)$

For 2-5, Simplify the polynomial, write in standard form, identify the degree, the leading coefficient, and the exact number of roots.

2. $(4x^5-7x^3+2)+(-2x^5-4x^3+4)$
3. $(5x^3-7x^2+3)-(7x^3+2x^2-4)$
4. $(4x-1)(x^2+2x-3)$
5. $(3x^2-2x)(x^2+3x-2)$

For 6-13, factor the polynomial completely, or identify it as irreducible.

6. $2x^2 - 2x$
7. $2b^3 + 2b^2 - 180b$
8. $27t^3 - 64$
9. $4x^3 + 2x^2 - 2x - 1$
10. $f^3 + 36f^2 - 4f - 16$
11. $x^2 - 10x + 25$
12. $2r^2 - 12r - 80$
13. $4x^4 + 32x$