Algebra 2   Name _____
Midterm Exam REVIEW
2014-15

15 points – completion   25 points – accuracy

The exam review will be graded on completion (15 points) and randomly selected problems solved and answered correctly (25 points).   In order to earn full credit, you must show all work for each problem!!

The exam review is due no later than:

- Monday January 5, 2014 or Tuesday January 6, 2014 for a maximum of 4 bonus points.

- Wednesday, January 7, 2014 for a maximum of 3 bonus points.

- Thursday, January 8, 2014 for a maximum of 2 bonus points.

- Friday, January 9, 2014 for a maximum of 1 bonus point.

- **Monday, January 12, 2014 is the final due date.**
      (This is an "A" Day…so "B" day classes will need to find me)

The exam review is due no later than Monday January 12th by 4:00 pm for completion and accuracy. You need to turn in the packet directly to the teacher - NOT the teacher mailboxes in the main office.

The midterm exam will cover all material in Units 2 - 4 and the parts of Unit 5 that we have covered in class by the end of first semester.

Be sure to study your old tests and quizzes from all units.

Name _____   Date _____

Cumulative Review   ⬭ **Circle your final solutions!!** ⬭

UNIT 2: Investigating Functions

1. Use your calculator to graph $y = x^3 + 6x^2 + 9x$

        End behavior: As x → _____, f (x) → _____. As x → _____, f (x) → _____.
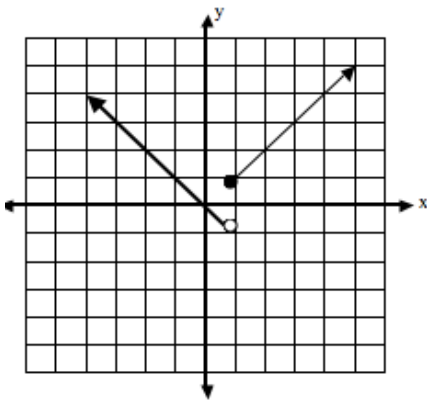
        Relative minimum/maximum? _____

        Absolute minimum/maximum? _____
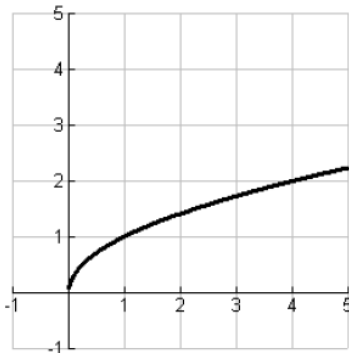
        Zeros? _____

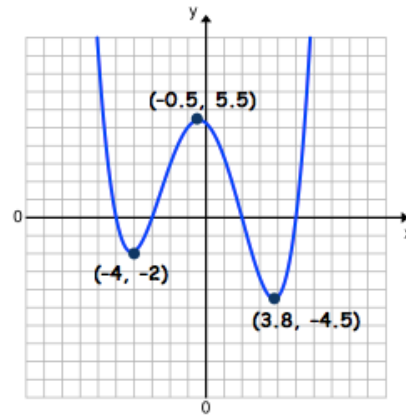   **Y-intercept?** _____

2. What type of discontinuity does this function have? Where does it occur?

3. Sketch the inverse of the function shown below, using three points from the graph.

4. Use the graph to the right to answer the followin

(-0.5, 5.5)

(-4, -2)

(3.8, -4.5)

What is the Domain?

     Interval Notation: _____   Inequality Notation: _____

What is the Range?

     Interval Notation: _____   Inequality Notation: _____
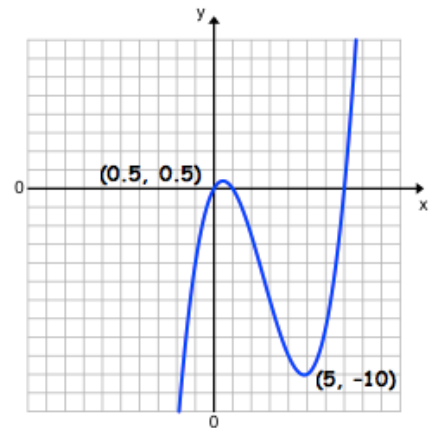
What are the zeros? _____

Is the INVERSE a function? _____ Explain _____

Identify: Relative Minimums _____   Relative Maximums _____

         Absolute Minimums _____Absolute Maximums _____

5. Use the graph to the right to answer the following:

(0.5, 0.5)

(5, -10)

Number of turning points: _____

Identify the Relative Minimums or Maximums _____

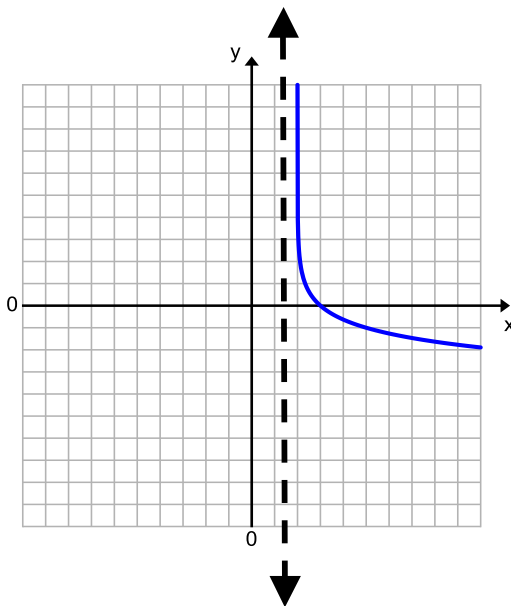Identify the Absolute Minimums or Maximums _____

Increasing Interval (s) _____

Decreasing Interval (s) _____

End Behavior:

As $x \to -\infty, f(x) \to$ _____

As $x \to +\infty, f(x) \to$ _____

6. Use the graph to the right to answer the following:

What is the Domain?

Interval Notation: _____   Inequality Notation: _____

What is the Range?

Interval Notation: _____   Inequality Notation: _____

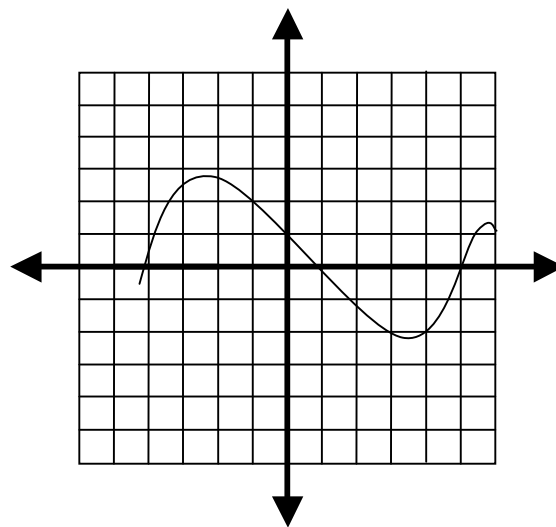What is the type of discontinuity shown? _____

7 & 8 Use the graph below to answer each question. **EXPLAIN YOUR ANSWERS**.

7.   Is this graph a function? _____

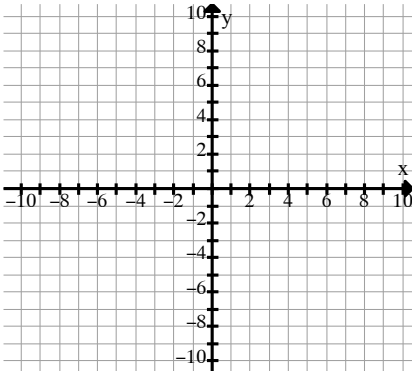   Explain:

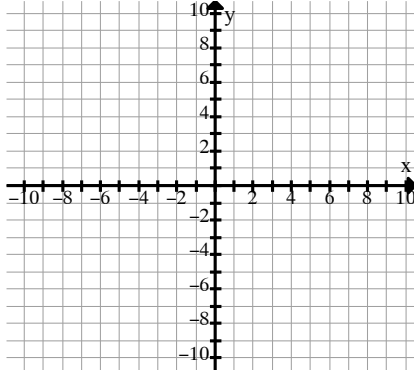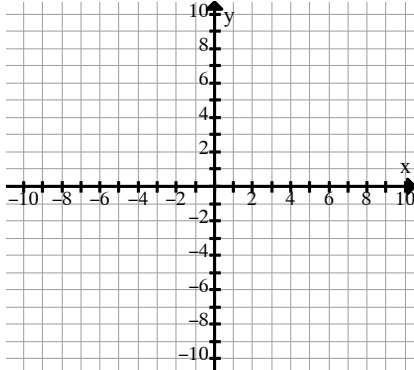8.   Is its inverse a function? _____

       Explain:
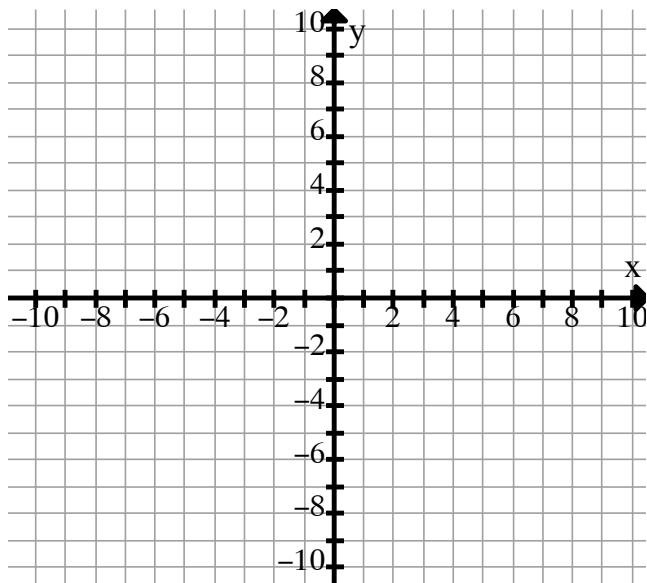
UNIT 3: Absolute Value Functions

1. Fill in the table based on each given absolute value equation. For vertex, domain, and range WRITE in your answer. For direction and dilation clearly CIRCLE your answer.

Function	Vertex	Direction	Dilation	Domain	Range
a. $y = \|x+2\|-3$		Up Down	Stretch Shrink Standard		
b. $y = -2\|x-4\|$		Up Down	Stretch Shrink Standard		
c. $y = -\frac{1}{4}\|x+3\|+1$		Up Down	Stretch Shrink Standard		
d. $y = \|x\|+5$		Up Down	Stretch Shrink Standard		
e. $y = -\|x-6\|$		Up Down	Stretch Shrink Standard		

2. Graph the following absolute value functions. You must include at least 5 points on your graph. (Be sure you can do this without a calculator!)

$y = \frac{2}{3}\|x+3\|+1$

Shape:
Vertex:
Standard/Stretch/Shrink:

$y = \|x+4\|$

Shape:
Vertex:
Standard/Stretch/Shrink:

$y = -2\|x-4\|-3$

Shape:
Vertex:
Standard/Stretch/Shrink:

3. Graph $y=|x+2|-5$ using at least three distinct points. Then complete the information on the right based on the graph.

Domain:
Range:
Vertex:
Y-intercept:
Zeros:
Increasing:
Decreasing:
End Behavior:

$$As\ x \to +\infty\ then\ f(x) \to \underline{}$$
$$As\ x \to -\infty\ then\ f(x) \to \underline{}$$

Solve the following equations for the indicated variable.

4. $|q + 3| = 1$	5. $2|5+ 2x|- 7 = 15$
6. $|2x + 12| = 4x$	7. $|x - 5| = -8$

Solve and graph the following inequalities.

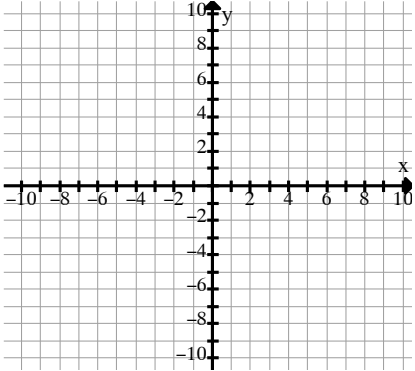|	
8. $2 + 3x < 5$	9. $-3x + 8 \leq x$
10. $5 \leq 2x + 3 < 11$	11. $\left\|2x + 4\right\| \geq 12$
12. $\left\|\dfrac{2}{3}x - 5\right\| \leq 5$	13. $\left\|x - 5\right\| < 12$
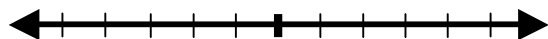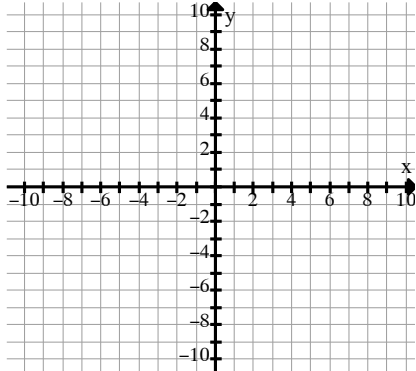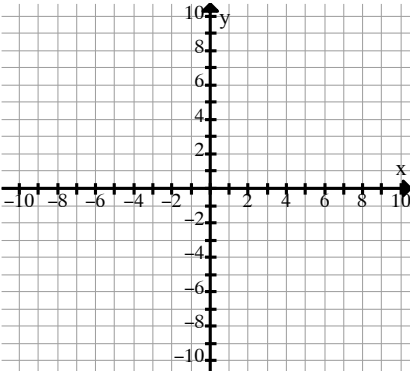
UNIT 4: Quadratics – GRAPHING PART 1

1. Complete the table.

Function	Form	Direction	Dilation	Vertex	Domain	Range
y = ½ (x + 1)² - 2	Standard Vertex Intercept	Up Down	Standard Stretch Shrink			
f(x) = x² - 6x + 5	Standard Vertex Intercept	Up Down	Standard Stretch Shrink			
y = (x – 4) (x + 6)	Standard Vertex Intercept	Up Down	Standard Stretch Shrink			
y = - 2x² - 8x + 5	Standard Vertex Intercept	Up Down	Standard Stretch Shrink			

2. Graph each quadratic function. (Be sure you can do this without a calculator!)

Y = x² – 2x - 8

$y = (x+4)(x-2)$

$y = -\dfrac{1}{2}(x-2)^2 + 5$

3. Graph the following using your calculator and fill in all blanks. Round values to 2 decimal places.

$$f(x) = \frac{1}{2}x^2 + x - 3.$$
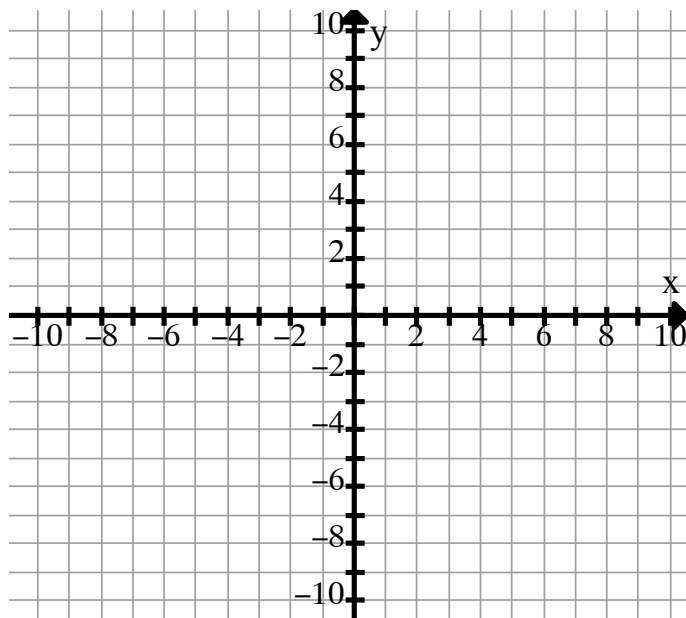
Vertex: _____

x - Intercepts: _____

Axis of Symmetry: _____

Y-intercept: _____

Domain: _____

Range: _____

Increasing: _____

Decreasing: _____

End Behavior:
  As $x \to -\infty$, $f(x) \to$ _____
  As $x \to +\infty$, $f(x) \to$ _____

Maximum Value of function: _____

Minimum Value of function: _____

UNIT 4: Quadratics – REAL & COMPLEX NUMBERS PART 2

Exponent Rules

1. $5a(-6a^3)^2$	2. $x^{\frac{1}{3}} \bullet x^{\frac{3}{5}}$	3. $4x^3y^{-5}z$
4. $\dfrac{-24x^4y^5}{3x^2y^6}$	5. $\dfrac{4x^3y^3}{2xy} \bullet \dfrac{5xy^2}{2y}$	6. $\left(4x^{\frac{1}{6}}y^3\right)^4$

Simplifying Square Roots
Simplify using the product rule. Assume all variables are positive.

7. $\sqrt{72}$	8. $\sqrt{24a^2b^4c^6}$
9. $\sqrt{216x^3y^5}$	10. $\sqrt{-144}$
11. $\sqrt{64}$	12. $\sqrt{108}$
13. $\dfrac{8}{\sqrt{10}}$	14. $32^{-\frac{1}{2}}$
15. $16^{\frac{3}{2}}$	16. $\sqrt{75}$
17. $48^{\frac{1}{2}}$	18. $\sqrt{-14}$
19. $\sqrt{-24}$	20. $\dfrac{\sqrt{18}}{\sqrt{9}}$

Operations with Square Roots

21. $13\sqrt{2} + 4\sqrt{18}$	22. $2\sqrt{12} - 3\sqrt{27}$	23. $2\sqrt{50} - \sqrt{32} + 3\sqrt{2}$
24. $-7\sqrt{6} \cdot \sqrt{2}$	25. $2\sqrt{12} \cdot \sqrt{18}$	26. $\dfrac{2}{3-\sqrt{7}}$

Complex Numbers: Simplify the following.

27. $(3 + 2i)(4 - 3i)$	28. $(3 + 4i) - (5 - 8i)$
29. $\dfrac{2}{3i}$	30. $\dfrac{3 - 2i}{5 + i}$

UNIT 4: Quadratics – Solving quadratics PART 3

Solve using the square root method:

1. $x^2 = 64$	2. $5(x - 2)^2 - 6 = 24$
3. $4(x - 1)^2 - 3 = 25$	4. $-3(x + 1)^2 = 81$
5. $(2x - 3)^2 = 121$	6. $(x - 3)^2 = -144$

Solve using factoring (zero product property):

7. $4x^2 + 24x = 0$	8. $x^2 - 16 = 0$
9. $x^2 - x - 12 = 0$	10. $4x^2 - 7x - 2 = 0$

Solve using the quadratic formula:

11. $x^2 + 2x + 7 = 0$	12. $x^2 - 5x - 4 = 0$

Solve by completing the square:

13. $x^2 - 6x - 7 = 0$	14. $x^2 + 4x + 8 = 0$

Solve using any method:
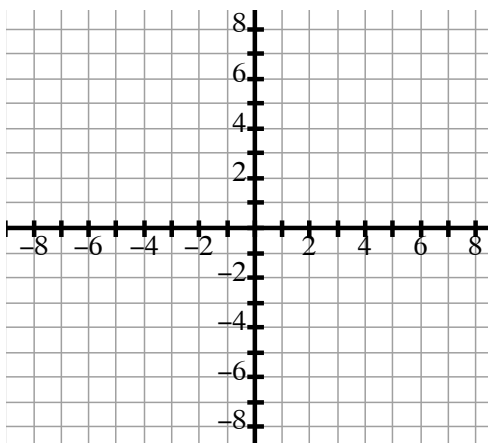
15. $x^2 - x = 6$	16. $x^2 + 8x - 13 = 0$

17. If $x^2 - 10x + c$ is a perfect square trinomial, what is the value of c? Then, write the trinomial in factored form, i.e, as a __square binomial__.

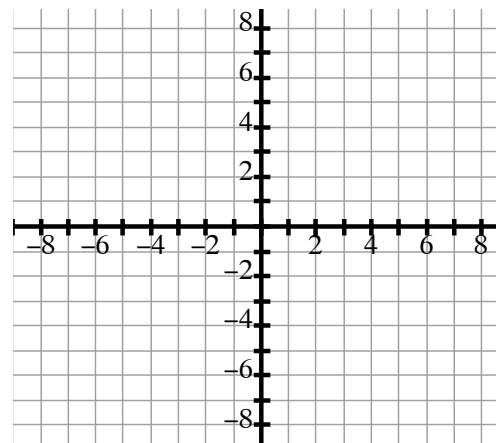18. How many real and imaginary solutions does the equation $5x^2 - 3x + 7 = 0$ have? Explain.

19. Find the solution set for the following system of equations __using graphing__.

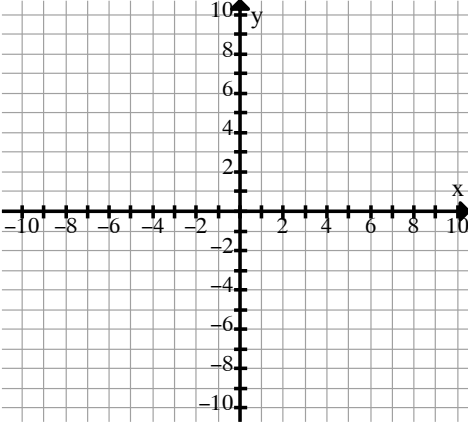|	
$y = \frac{1}{2}x - 3$ $y = x^2 + 4x - 14$	$y = x^2 + 1$ $y = -x^2 + 9$
Solutions: _____	Solutions: _____

20. Given the quadratic equation $x^2 - 4x - 12 = 0$

Solve by the Zero Product Property (Factoring)	Solve by Completing the Square	Solve Using the Quadratic Formula
$x^2 - 4x - 12 = 0$	$x^2 - 4x - 12 = 0$	$x^2 - 4x - 12 = 0$
Solutions:_____	Solutions:_____	Solutions:_____

Rewrite to Intercept Form	**Rewrite to Vertex Form**	**Describe the Root**
$y = x^2 - 4x - 12$	$y = x^2 - 4x - 12$	$y = x^2 - 4x - 12$
		Find the Discriminant: _____
Intercept form:_____ Identify the x-intercepts (,) and (,)	Vertex Form:_____ Identify the Vertex: _____	Identify the Number and Type of Solutions: _____ _____

Given $y = x^2 - 4x - 12$

Find the Vertex: _____

Axis of symmetry: _____

Direction: _____

Size (Vertical Stretch, Vertical Shrink or Normal): _____

Graph $y = x^2 - 4x - 12$

You must include 5 distinct points.

Be sure to study all information regarding unit 5! The material will be taught prior to exams.