

Pre Calculus Honors

Name: \_\_\_\_\_

Summer Assignment

Date: \_\_\_\_\_ Block: \_\_\_\_\_

**Robbinsville School District**  
**Honors PreCalculus Summer Assignment**

Welcome to Honors PreCalculus! On the following pages you will find your summer assignment for the upcoming 2017-2018 school year. The summer assignment reviews material that you have learned in Honors Geometry and Honors Algebra 2. The packet is to be fully completed with work shown; it will be collected for a grade and is due on the **first day of school**. Be prepared for an assessment on this material during the first week of school to determine your readiness for this honors level class.

If you need assistance, use your Algebra 2 notes and/or on-line videos to review the material. There are some videos provided. These videos may be accessed on any web-connected device with any web browser. Additionally QR codes are available within the packet, when scanned using a smartphone or tablet these codes will link directly to the corresponding video. Many of the links are from the website: [www.showme.com/RHS-Math](http://www.showme.com/RHS-Math). On the following page, all of the videos are listed, as well as the questions they pertain to.

Problems	Topic	Link
1,4,5	Characteristics of Functions	<a href="https://www.youtube.com/watch?v=kKsWbhFvoy0">https://www.youtube.com/watch?v=kKsWbhFvoy0</a> <a href="https://www.youtube.com/watch?v=f4T69QJIS8Q">https://www.youtube.com/watch?v=f4T69QJIS8Q</a>
2	Intersect Feature on the Calculator	<a href="https://search.yahoo.com/yhs/search?type=odc179&amp;hspart=avast&amp;hsimp=yhs-001&amp;p=video+of+using+the+intersect+feature+on+the+calculator">https://search.yahoo.com/yhs/search?type=odc179&amp;hspart=avast&amp;hsimp=yhs-001&amp;p=video+of+using+the+intersect+feature+on+the+calculator</a>
3	Regression Equations	<a href="http://www.showme.com/sh/?h=hfZ1eAi">http://www.showme.com/sh/?h=hfZ1eAi</a> <a href="https://www.youtube.com/watch?v=g_rTDWZpEVw">https://www.youtube.com/watch?v=g_rTDWZpEVw</a>
4,5	Graphing Piecewise Functions	<a href="http://www.showme.com/sh/?h=C6uAlii">http://www.showme.com/sh/?h=C6uAlii</a> <a href="http://www.showme.com/sh/?h=feFP6fi">http://www.showme.com/sh/?h=feFP6fi</a>
6 - 9	Transformations of Parent Functions	<a href="https://www.youtube.com/watch?v=dVJj3tCOOA8">https://www.youtube.com/watch?v=dVJj3tCOOA8</a> <a href="http://www.showme.com/sh/?h=btYeMIC">http://www.showme.com/sh/?h=btYeMIC</a> <a href="https://www.youtube.com/watch?v=t7cm9qNgBNI">https://www.youtube.com/watch?v=t7cm9qNgBNI</a>
10-20	Operations with Radicals and Imaginary Numbers	<a href="http://www.showme.com/sh/?h=nh16Neq">http://www.showme.com/sh/?h=nh16Neq</a> <a href="http://www.showme.com/sh/?h=gsQIKQK">http://www.showme.com/sh/?h=gsQIKQK</a> <a href="http://www.showme.com/sh/?h=oxTkum0">http://www.showme.com/sh/?h=oxTkum0</a>
21-22	Simplifying Rational Expressions	<a href="http://www.showme.com/sh/?h=JF5x06q">http://www.showme.com/sh/?h=JF5x06q</a> <a href="http://www.showme.com/sh/?h=T7dNUIK">http://www.showme.com/sh/?h=T7dNUIK</a>
23	Exponent Rules and Rational Exponent Rules	<a href="http://www.showme.com/sh/?h=P7oZjWa">http://www.showme.com/sh/?h=P7oZjWa</a> <a href="http://www.showme.com/sh/?h=hwvtzFI">http://www.showme.com/sh/?h=hwvtzFI</a>
24-27	Function Operations (combinations and compositions)	<a href="http://www.showme.com/sh/?h=OFMVvpw">http://www.showme.com/sh/?h=OFMVvpw</a> <a href="http://www.showme.com/sh/?h=1suQNxg">http://www.showme.com/sh/?h=1suQNxg</a> <a href="http://www.showme.com/sh/?h=ir4Fr4C">http://www.showme.com/sh/?h=ir4Fr4C</a>
28-29	Inverse Functions	<a href="https://www.brightstorm.com/math/algebra-2/inverse-exponential-and-logarithmic-functions/finding-an-inverse-algebraically/">https://www.brightstorm.com/math/algebra-2/inverse-exponential-and-logarithmic-functions/finding-an-inverse-algebraically/</a> <a href="https://www.youtube.com/watch?v=2-kZhlLB-T4">https://www.youtube.com/watch?v=2-kZhlLB-T4</a>
30-37	Factoring	<a href="http://www.showme.com/sh/?h=gMGcCT2">http://www.showme.com/sh/?h=gMGcCT2</a> <a href="http://www.showme.com/sh/?h=D5Mz6zA">http://www.showme.com/sh/?h=D5Mz6zA</a> <a href="http://www.showme.com/sh/?h=yRvNM92">http://www.showme.com/sh/?h=yRvNM92</a> <a href="http://www.showme.com/sh/?h=VB29qWu">http://www.showme.com/sh/?h=VB29qWu</a>
38-45	Solving Zeros Algebraically	<a href="http://www.showme.com/sh/?h=sUHVA48">http://www.showme.com/sh/?h=sUHVA48</a> <a href="https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-by-completing-the-square/v/completing-the-square-to-solve-quadratic-equations">https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-by-completing-the-square/v/completing-the-square-to-solve-quadratic-equations</a>
46,48,50	Writing Equations Between Two Points	<a href="http://www.showme.com/sh/?h=tudab1U">http://www.showme.com/sh/?h=tudab1U</a>
47,49	Point-Slope Form of Linear Equations	<a href="http://www.showme.com/sh/?h=FQGDJSK">http://www.showme.com/sh/?h=FQGDJSK</a>

**Part 1: Graphing Calculator Section: Use a graphing calculator for these problems:**  
**TOPICS: Analyzing Graphs, Solving, Regression**

Directions: Graph the following function using your calculator. Sketch the graph on the coordinate plane using an appropriate scale. Then fill in the characteristics of the graph. Use interval notation where appropriate.



1.  $f(x) = x^5 - x^4 - 10x^3 + x^2 + 23x + 14$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Increasing Interval: \_\_\_\_\_

Decreasing Interval: \_\_\_\_\_

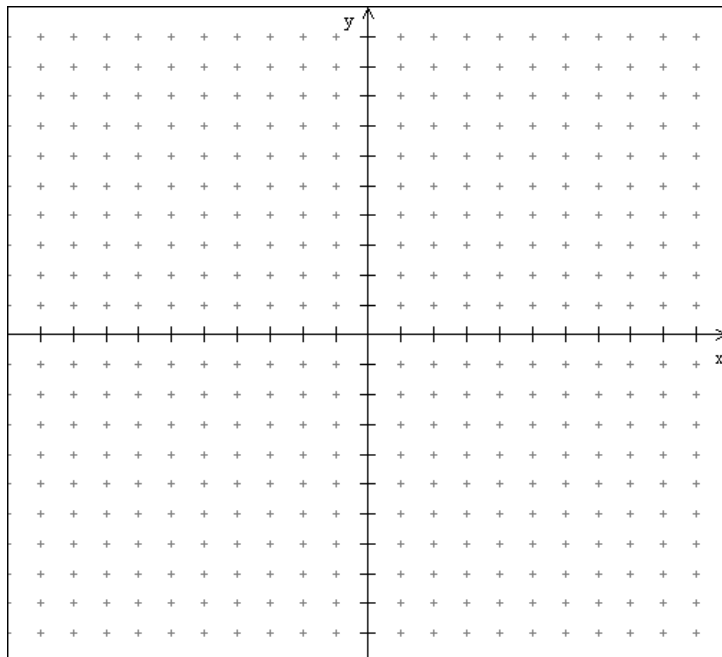
Constant Interval: \_\_\_\_\_

Relative Minimum(s): \_\_\_\_\_

Relative Maximum(s): \_\_\_\_\_

Zero(s): \_\_\_\_\_

y-intercept: \_\_\_\_\_



2. Solve the following equations using the intersect feature on the calculator. Round to the nearest thousandth.

a)  $2x^2 - 5x - 18 = 10$

Solution: \_\_\_\_\_

b)  $\frac{4x-1}{x^2-9} = 4$

Solution: \_\_\_\_\_

c)  $\sqrt{x+7} = x+5$

Solution: \_\_\_\_\_

3. Input the following data into the calculator.

time (days)	0	1	2	3	4	5
population	30	133	214	337	527	819

a) Write the equation of the linear, quadratic, and exponential model:

b) Use the best fitting model to find the population after 7 days: \_\_\_\_\_



**Part 2: Non-Calculator Section:** These topics will arise on the non-calculator sections of upcoming tests and quizzes throughout the year. Please complete these problems without the use of any calculator. All work must be shown in order to receive credit.



**TOPIC: GRAPHS AND PARENT GRAPHS**

Directions: Graph the following piecewise functions and determine the requested properties. Use interval notation where appropriate.

$$4. f(x) = \begin{cases} 3x + 2 & x < -2 \\ x^2 + 1 & -2 \leq x < 1 \\ 6 & x \geq 1 \end{cases}$$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

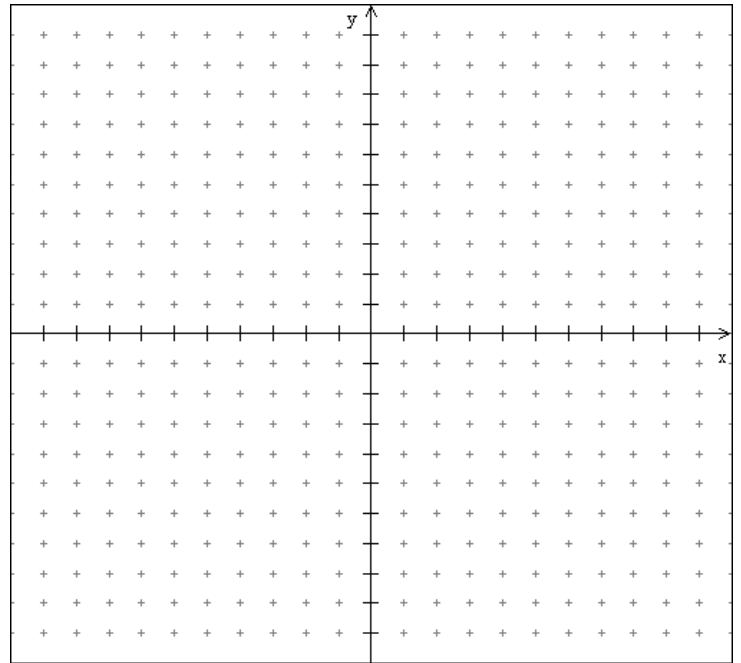
Increasing: \_\_\_\_\_

Decreasing: \_\_\_\_\_

Constant: \_\_\_\_\_

$f(1) =$  \_\_\_\_\_

For what value of  $x$  is  $f(x) = -7$ ? \_\_\_\_\_



Directions: Given the graph determine the corresponding piecewise functions and determine the requested properties. Use interval notation where appropriate.

5. Piecewise equations: Restrictions:

$$f(x) = \left\{ \right.$$

Domain: \_\_\_\_\_

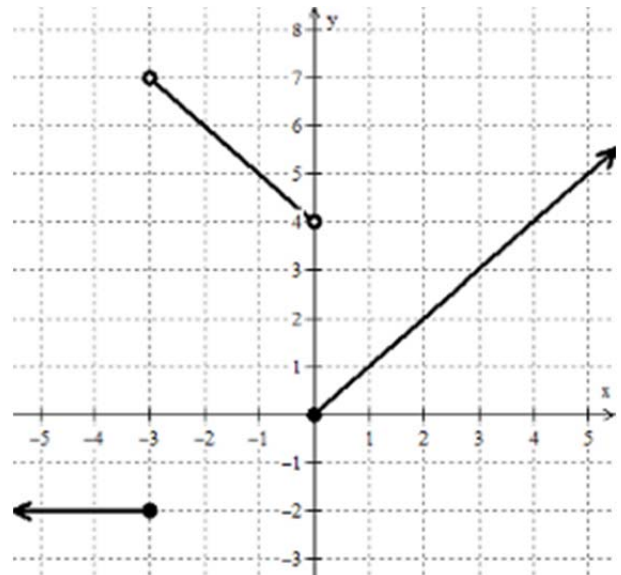
Range: \_\_\_\_\_

Increasing: \_\_\_\_\_

Decreasing: \_\_\_\_\_

Constant: \_\_\_\_\_

$f(-3) =$  \_\_\_\_\_



For # 6 – 9 Directions: Describe the parent function and transformations. Then, sketch the transformation. Write the domain and range using interval notation.



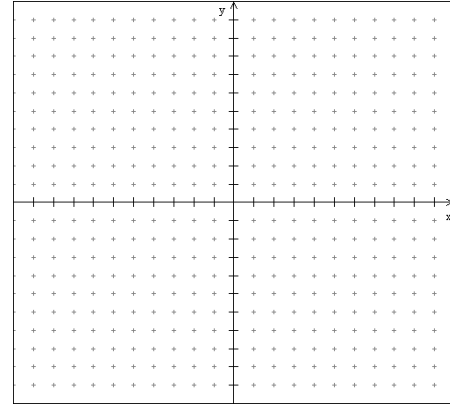
6. Equation:  $f(x) = -2|x - 3| + 4$

Parent: \_\_\_\_\_

Description: \_\_\_\_\_  
\_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



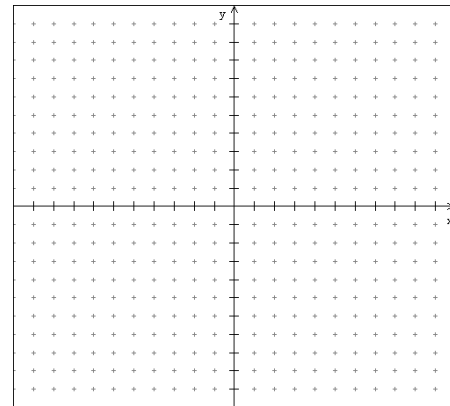
7. Equation:  $g(x) = \left(\frac{1}{3}(x + 2)\right)^2 - 1$

Parent: \_\_\_\_\_

Description: \_\_\_\_\_  
\_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



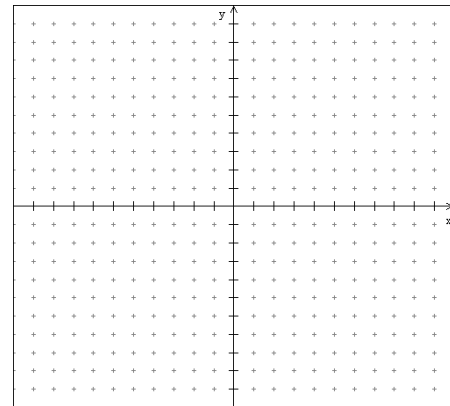
8. Equation:  $h(x) = -\sqrt{2(x - 1)}$

Parent: \_\_\_\_\_

Description: \_\_\_\_\_  
\_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



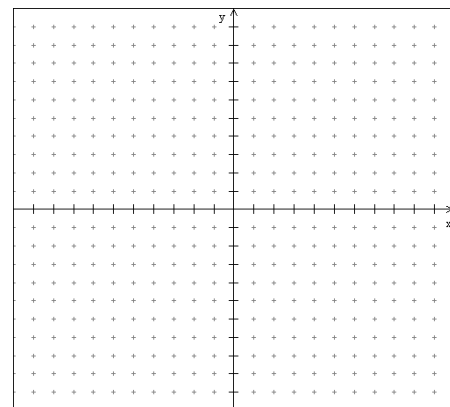
9. Equation:  $k(x) = \frac{1}{x+5} + 3$

Parent: \_\_\_\_\_

Description: \_\_\_\_\_  
\_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



## TOPIC: Simplifying Radicals and Rational Expressions



Directions: For each problem, completely simplify the expression.

Remember to show all work and write your final answer in exact form on the line provided. Rationalize denominators.

10.  $\sqrt{150}$  10. \_\_\_\_\_

11.  $\frac{4}{\sqrt{80}}$  11. \_\_\_\_\_

12.  $\sqrt[4]{32x^{12}y^8} \cdot \sqrt[4]{324y^5}$  12. \_\_\_\_\_

13.  $(2\sqrt{21})(3\sqrt{15})$  13. \_\_\_\_\_

14.  $\sqrt{\frac{4}{72}}$  14. \_\_\_\_\_

15.  $\sqrt[3]{-250x^{20}}$  15. \_\_\_\_\_

16.  $3\sqrt{200} + 2\sqrt{8}$  16. \_\_\_\_\_

17.  $\frac{6+\sqrt{3}}{5-\sqrt{3}}$  17. \_\_\_\_\_

18.  $\sqrt{-500}$

18. \_\_\_\_\_

19.  $(3 + 2i) + (5 + 7i)$

19. \_\_\_\_\_

20.  $(-2 + \sqrt{-9})(6 + \sqrt{-25})$

20. \_\_\_\_\_

21. 
$$\frac{\frac{x}{x-1} + 1}{\frac{x-2}{x}}$$



21. \_\_\_\_\_

22. 
$$\frac{x + \frac{2}{x+1}}{x - \frac{3}{x-2}}$$

22. \_\_\_\_\_

For #23 simplify, remember all exponents should be positive. Keep them in rational form.



23. 
$$\frac{100y^3\sqrt{z^3}w^{-1}}{5\sqrt{yz^{-2}w^{-3}}}$$

23. \_\_\_\_\_

**TOPIC: Functions, Combinations of Functions, Compositions of Functions, Inverse Functions**



24. Given  $g(n) = -3(n - 4)^2 - n$  and  $h(n) = n^{\frac{4}{3}} + n$  determine the following. Write your final answer on the line provided.

a)  $h(-8)$  24a. \_\_\_\_\_

b)  $g(h(27))$  24b. \_\_\_\_\_

c)  $g(n + 5)$  24c. \_\_\_\_\_



25 – 27. For each pair of functions, algebraically determine  $(f + g)(x)$ ,  $(f - g)(x)$ ,  $(fg)(x)$ ,  $\left(\frac{f}{g}\right)(x)$ ,  $(f \circ g)(x)$ , and  $(g(f(x)))$ . Write your final answer for each on the line provided. State the appropriate domain if it is not  $(-\infty, \infty)$ .

25.  $f(x) = 4x + 3$  and  $g(x) = x^2 + 2x + 3$

$(f + g)(x) =$  \_\_\_\_\_

$(f - g)(x) =$  \_\_\_\_\_

$(fg)(x) =$  \_\_\_\_\_

$\left(\frac{f}{g}\right)(x) =$  \_\_\_\_\_

$(f \circ g)(x) =$  \_\_\_\_\_

$(g(f(x))) =$  \_\_\_\_\_

26.  $f(x) = x^2 - 16$  and  $g(x) = \sqrt{x}$

$(f + g)(x) =$  \_\_\_\_\_

$(f - g)(x) =$  \_\_\_\_\_

$(fg)(x) =$  \_\_\_\_\_

$\left(\frac{f}{g}\right)(x) =$  \_\_\_\_\_

$(f \circ g)(x) =$  \_\_\_\_\_

$(g(f(x))) =$  \_\_\_\_\_

27.  $f(x) = \frac{x-4}{x^2-25}$  and  $g(x) = \frac{2}{x+1}$

$(f + g)(x) =$  \_\_\_\_\_

$(f - g)(x) =$  \_\_\_\_\_

$(fg)(x) =$  \_\_\_\_\_

$\left(\frac{f}{g}\right)(x) =$  \_\_\_\_\_

$(f \circ g)(x) =$  \_\_\_\_\_

$(g(f(x))) =$  \_\_\_\_\_

Directions: For each problem, find the inverse. Then show  $f(f^{-1}(x)) = x$  and  $f^{-1}(f(x)) = x$  to prove the functions are inverses.

28.  $f(x) = \frac{6}{x+3}$



Inverse:	$f(f^{-1}(x)) = x$	$f^{-1}(f(x)) = x$
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29.  $f(x) = \frac{x}{2} - 1$

Inverse:	$f(f^{-1}(x)) = x$	$f^{-1}(f(x)) = x$
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**TOPIC: Factoring**



Directions. Factor each expression completely. Write your final answer on the line provided.

30.  $2x^2 - 3x - 2$

30. \_\_\_\_\_

31.  $8y^3 - 125$

31. \_\_\_\_\_

32.  $6x^2 + 5x - 6$  32. \_\_\_\_\_

33.  $8x^2 - 4x - 24$  33. \_\_\_\_\_

34.  $a^2 - 4ab + 4b^2$  34. \_\_\_\_\_

35.  $36x^2 - 100y^2$  35. \_\_\_\_\_

36.  $5x^{100} - 80y^{100}$  36. \_\_\_\_\_

37.  $8(a - 3)^2 - 64(a - 3) + 128$  37. \_\_\_\_\_

## TOPIC: Solving equations algebraically



Directions: Solve for the zeros of the following functions by solving for  $x$  when  $y=0$ . Show your work algebraically. Keep all solutions in exact form – written as a simplified radical or fraction where appropriate.

38.  $y = 3x - 7$  38. \_\_\_\_\_

39.  $y = x^2 - 14x + 45$  39. \_\_\_\_\_

40.  $y = x(x + 1)(2x - 5)(x - 3)^2$  40. \_\_\_\_\_

41.  $y = x^2 - 12$  41. \_\_\_\_\_

42.  $y = x^4 - 7x^2 + 12$  42. \_\_\_\_\_

43.  $y = x^5 - 3x^3 + 8x^2 - 24$

43. \_\_\_\_\_

44. Solve for the zeros using quadratic formula.

44. \_\_\_\_\_

$$3x^2 + 2x - 5 = 0$$

45. Solve for the zeros by completing the square.

45. \_\_\_\_\_

$$2x^2 - 10x + 13 = 0$$

**TOPIC: Equations of Lines**



Directions: Write the equation of the line that meets the criteria given in the form requested. All numbers should be written as fractions where appropriate.

46. The line through  $(3, -2)$  with slope  $m = \frac{4}{5}$  in slope-intercept form. 46. \_\_\_\_\_

47. The line through points  $(-1, -4)$  and  $(3, 2)$  in point-slope form. 47. \_\_\_\_\_

48. The line through points  $(-2, 4)$  with a slope of  $m = 0$ . 48. \_\_\_\_\_

49-50. Given  $f(-2) = 1$  and  $f(-1) = 3$

49. Write the equation of the line between the points in point-slope form. 49. \_\_\_\_\_

50. Find the exact distance between the two points. 50. \_\_\_\_\_