Pre Calculus Honors

Summer Assignment

Name: _____

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 2019-20 school year. The summer assignment reviews material that you have learned in Honors Geometry and Honors Algebra 2. You are expected to solve problems #4 – 50 without the use of a calculator. 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 fast paced and intensive 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 . 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	https://www.youtube.com/watch?v=kKsWbhFvoy0 https://www.youtube.com/watch?v=f4T69QJlS8Q
2	Intersect Feature on the Calculator	https://search.yahoo.com/yhs/search?type=odc179&hspart=avast&hsimp=yhs-001&p=video+of+using+the+intersect+feature+on+the+calculator
3	Regression Equations	http://www.showme.com/sh/?h=hfZ1eAi https://www.youtube.com/watch?v=g_rTDWZpEVw
4,5	Graphing Piecewise Functions	http://www.showme.com/sh/?h=C6uAlii http://www.showme.com/sh/?h=feFP6fI
6 - 9	Transformations of Parent Functions	https://www.youtube.com/watch?v=dVJj3tCOOA8 http://www.showme.com/sh/?h=btYeMIC https://www.youtube.com/watch?v=t7cm9qNgBNI
10-20	Operations with Radicals and Imaginary Numbers	http://www.showme.com/sh/?h=nh16Neq http://www.showme.com/sh/?h=gsQIKQK http://www.showme.com/sh/?h=oxTkum0
21-22	Simplifying Rational Expressions	http://www.showme.com/sh/?h=JF5x06q http://www.showme.com/sh/?h=T7dNUIK
23	Exponent Rules and Rational Exponent Rules	http://www.showme.com/sh/?h=P7oZjWa http://www.showme.com/sh/?h=hwvtzFI
24-27	Function Operations (combinations and compositions)	http://www.showme.com/sh/?h=OFMVvpw http://www.showme.com/sh/?h=1suQNxg http://www.showme.com/sh/?h=ir4Fr4C
28-29	Inverse Functions	https://www.brightstorm.com/math/algebra-2/inverse-exponential-and-logarithmic-functions/finding-an-inverse-algebraically/ https://www.youtube.com/watch?v=2-kZhlLB-T4
30-37	Factoring	http://www.showme.com/sh/?h=gMGCcT2 http://www.showme.com/sh/?h=D5Mz6zA http://www.showme.com/sh/?h=yRvNM92 http://www.showme.com/sh/?h=VB29qWu
38-45	Solving Zeros Algebraically	http://www.showme.com/sh/?h=sUHVA48 https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-by-completing-the-square/v/completing-the-square-to-solve-quadratic-equations
46,48,50	Writing Equations Between Two Points	http://www.showme.com/sh/?h=tudab1U
47,49	Point-Slope Form of Linear Equations	http://www.showme.com/sh/?h=FQGDJSK

Honors Pre-Calculus Name:_____

Summer Packet Date:_____Period:_____

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.
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:_____ Relative Minimum(s): _____

Range: _____ Relative Maximum(s): _____

Increasing Interval:_____ Zero(s): _____

Decreasing Interval: _____ y-intercept: _____

Constant Interval: _____

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. Also state the correlation coefficient:

Linear:_____ r^2:_____

Quadratic:_____ r^2:_____

Exponential:_____ r^2:_____

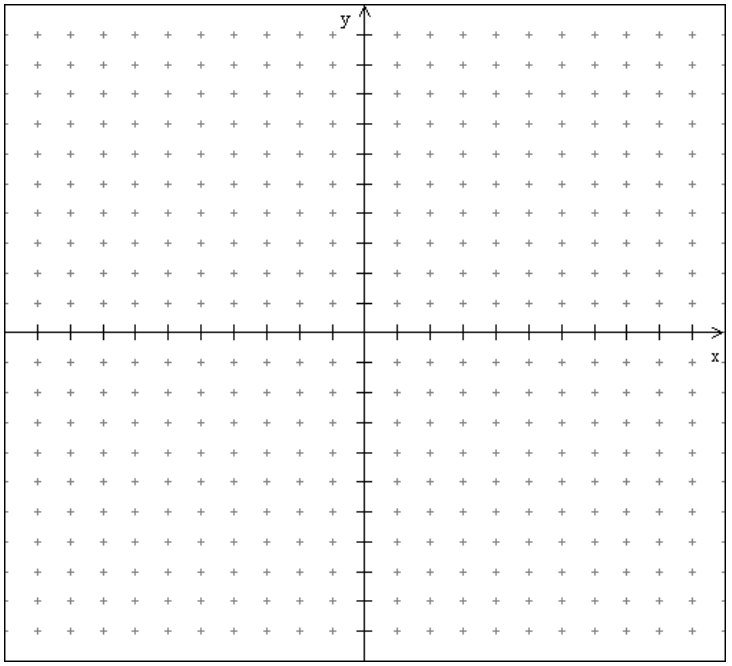
b) Which model fits the data best? Explain. Use the best fitting model to find the population after 7 days:

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:_____

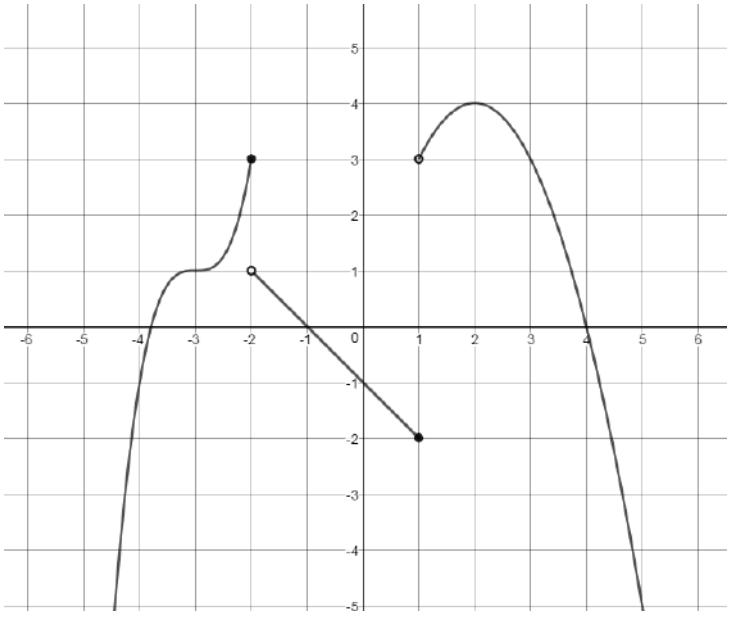
$f(1) =$_____

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:

$$f(x) = \begin{cases} \\ \\ \end{cases}$$



Domain: _____

Range: _____

Increasing:_____

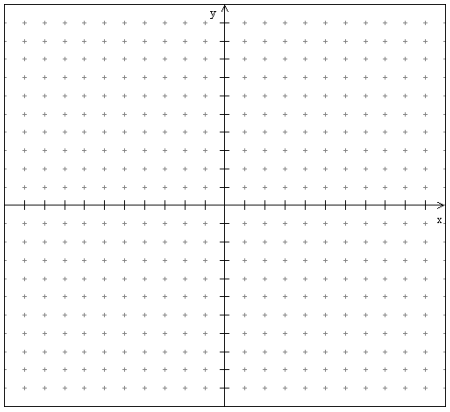
Decreasing: _____

Constant:_____

$f(-2) =$ _____

For # 6 – 7 Directions: Describe the parent function and transformations. Then, sketch the transformation. Write the domain and range using interval notation.

6. Equation: $h(x) = -\sqrt{\frac{1}{2}(x-1)} - 4$



Parent:_____

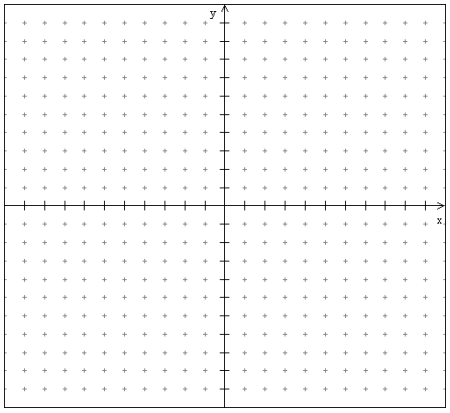
Description:_____

_____

Domain:_____

Range:_____

7. 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.

8. $\sqrt{150}$ 8._____

9. $\sqrt[4]{32x^{12}y^8} \cdot \sqrt[4]{324y^5}$ 9._____

10. $\sqrt{\frac{4}{72}}$ 10._____

11. $3\sqrt{200} + 2\sqrt{8}$ 11._____

12. $\frac{6+\sqrt{3}}{5-\sqrt{3}}$ 12._____

13. $\sqrt{-500}$ 13._____

14. $(3 + 2i) + (5 + 7i)$ 14._____

15. $\left(-2 + \sqrt{-9}\right)(6 + \sqrt{-25})$ 15._____

16. $\dfrac{\frac{x}{x-1}+1}{\frac{x-2}{x}}$   16._____

17. $\dfrac{x+\dfrac{2}{x+1}}{x-\dfrac{3}{x-2}}$ 17._____

For #18 simplify, remember all exponents should be positive. Keep them in rational form.  

18. $\dfrac{100y^3\sqrt{z^3}w^{-1}}{5\sqrt{y}z^{-2}w^{-3}}$ 18._____

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

19. 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) $h(-8)$ 19a._____

b) $g(h(8))$ 19b._____

c) $g(n+5)$ 19c._____

20 – 21. 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* $(-\infty, \infty)$.

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

$(f+g)(x) =$_____

$(f-g)(x) =$_____

$(fg)(x) =$_____

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

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

$(g(f(x)) =$_____

21. $f(x) = \frac{x-4}{x^2-25}$ 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.

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

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

TOPIC: Factoring

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

23. $8y^3 - 125$ 23._____

24. $6x^2 + 5x - 6$ 24._____

25. $8x^2 - 4x - 24$ 25._____

26. $a^2 - 4ab + 4b^2$ 26._____

27. $5x^{100} - 80y^{100}$ 27._____

28. $8(a-3)^2 - 64(a-3) + 128$ 28._____

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.

29. $y = x^2 - 14x + 45$ 29._____

30. $y = x(x + 1)(2x - 5)(x - 3)^2$ 30._____

31. $y = x^2 - 12$ 31._____

32. $y = x^4 - 7x^2 + 12$ 32._____

33. $y = x^5 - 3x^3 + 8x^2 - 24$ 33._____

34. Solve for the zeros using quadratic formula. 34._____

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

35. Solve for the zeros by completing the square. 35._____

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

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.

36. The line through $(3, -2)$ with slope $m = \frac{4}{5}$ in slope-intercept form. 36._____

37. The line through points $(-1, -4)$ and $(3,2)$ in point-slope form. 37._____

38. The line through points $(-2,4)$ with a slope of $m = 0$. 38._____

39-40. Given $f(-2) = 1$ and $f(-1) = 3$

39. Write the equation of the line between the points in point-slope form. 39._____

40. Find the exact distance between the two points. 40._____

Topic: Trigonometry. Any questions with "NC" complete without a calculator.

You must know the Unit Circle and be able to evaluate angles in radian and degree quickly!

41)NC Evaluate the following:

a) $\sin(\pi/4)$ 41a. _____

b) $\cos(2\pi/3)$ 41b. _____

c) $\tan(\pi/6)$ 41c. _____

d) $\csc(4\pi/3)$ 41d. _____

e) $\sec(11\pi/6)$ 41e. _____

42)NC Find one positive and one negative coterminal angle for the given angle. Keep angle measure in the given form. Then sketch the given angle measure.

a) 227° 42a. _____

b) -176° 42b. _____

c) $\frac{\pi}{12}$ 42c. _____

d) $-\frac{3\pi}{4}$ 42d. _____

43) Verify the following using the appropriate trig identities.

$\sec^2\theta\,(1-\cos^2\theta)=\tan^2\theta$

44) Solve the following trig equation. Give specific solutions on the interval $[0, 2\pi)$.

$2\sin^2 x-\sin x-3=0$

Topic: Applications

The height of an object in free fall is given by:

$s(t) = -\frac{1}{2}gt^2 + v_o t + s_o$ where t is the time in seconds, $g \approx 32\ ft/\sec^2 \approx 9.8\ m/\sec^2$, $v_o =$ $initial\ velocity$ and $s_0 = initial\ height$.

46. As a promotion for the Houston Astros downtown ballpark, a competition is held to see who can throw a baseball the highest from the front row of the upper deck of seats, 83 feet above the field. The winner throws the ball with an initial vertical velocity of 92 ft/sec and it lands on the infield grass.

a) What quadratic equation models the above scenario? 46a. _____

b) Find the maximum height of the baseball using a formula. 46b. _____

c) How much time is the ball in the air? Show algebraic work. 46c. _____

47. Consider all rectangles with an area of 182 square feet. Let *x* be the length of one side of such a rectangle.

a) Express the perimeter as a function of x. 47a. _____

b) Use the graphing calculator to find the dimensions of the rectangle that has the least perimeter. What is the least perimeter? 47b. _____