**Notre Dame High School**

**220 Jefferson Street**
**Fairfield, CT 06825**
**June 2015**

Dear Parent(s)/Guardian(s) and Incoming Honors and High Honors Analysis Students,

Mathematics is the gateway to all college and career opportunities. As stated by the National Research Council:

"Students today are growing up in a world permeated by mathematics. The technologies used in homes, schools, and the workplace are all built on mathematical knowledge. Many educational opportunities and good jobs require high levels of mathematical expertise."

In an effort to get you ready for the upcoming year in Analysis you are being asked to complete this math packet and have it ready to hand in on Wednesday, September 2, 2015. Many of the concepts that we will encounter this year requires students to have a good understanding of Algebra. We will be building on prior concepts this year. The book that we will be using in the upcoming year is titled PRECALCULUS with LIMITS A Graphing Approach, Seventh Edition by Ron Larson. It has a copyright of 2016 and is Published by Cenage Learning. The book also has a companion website at LarsonPrecalculus.com. There are videos that explain different topics and also the answers to the odd examples are also there. You will have to make sure that you select the correct book as this is the site for all books by Ron Larson. All High Honors and Honors Analysis students are required to complete the enclosed Summer 2015 Math packet.

All students in Honors and High Honors Analysis are required to have a TI-84 or TI-nspire CX calculator. Just by the title of the book, there will be a great deal of graphing done in this class and the graphing calculator will become a very useful and necessary tool. If a student has another brand of graphing calculator that will also be acceptable but the teachers of the Mathematics Department are most familiar with the Texas Instrument calculators and we have the emulators for the Smart Board for these calculators.

Summer Packet Guidelines:

## Calculators may be used to solve problems.

- All work must be done in pencil and shown under each problem.
- Summer packets for High Honors and Honors Analysis classes are due Wednesday, September 2, 2015
- After reviewing packets, the teachers of these classes will know which preliminary skills need to be reviewed with the students.

The teachers of the Mathematics Department are available after school for extra help. I encourage all students to take advantage of working with their own teacher so the teacher can fully assess their knowledge of mathematics.

Please feel free to email me with any concerns or questions over the summer. I will be doing day trips during the summer but will get back to you within a few days of your email. You may reach me at: zembrzuski@notredame.org In the subject area indicate if it is an Analysis question.

Sherrie Zembrzuski
Math Department Chairperson

# SUMMER MATH PACKET

# NOTRE DAME HIGH SCHOOL

# ANALYSIS

# HH/H

**The examples on the following pages are to be completed and handed into your teacher on Wednesday, September 2, 2015. This will aid the teachers of these classes to give focus to mathematical concepts that will be necessary for this class.**

**Name**_____

ANALYSIS

GRAPHS

The Distance and Midpoint Formulas; Graphing Utilities; Introduction to Graphing Equations

Distance formula: If $P_1 = (x_1,y_1)$ and $P_2 = (x_2,y_2)$ are on the same line, the distance between the two points is:

$$d(P_1,P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint formula: $M = (x,y) = \left(\frac{x_1+x_2}{2} + \frac{y_1+y_2}{2}\right)$

Graph an equation by finding points.

Graph an equation by using your graphing calculator.

A point P(x,y) is a solution to the equation if when substituted in the equation for x and y and you get a true statement.

Intercepts; Symmetry; Graphing Key Equations

Find intercepts algebraically from an equation:

a). x-intercept: In the equation, let y = 0 and solve for x

b). y-intercept: In the equation let x = 0 and solve for y

Test an equation for symmetry:

a). A graph is symmetric with respect to the x-axis if, for every point (x,y) on the graph, the point (x, -y) is also on the graph.

Replace y by -y in the equation. If an equivalent equation results, the graph of the equation is symmetric with respect to the x-axis

b). A graph is symmetric with respect to the y-axis, if , for every point (x,y) on the graph, the point (-x,y) is also on the graph.

Replace x by -x in the equation. If an equivalent equation results, the graph of the equation is symmetric with respect to the y-axis

c). A graph is symmetric with respect to the origin if, for every point (x,y) on the graph, the point (-x, -y) is also on the graph.

Replace x by -x and y by -y in the equation. If an equivalent equation results, the graph of the equation is symmetric with respect to the origin

Solving Equations Using a Graphing Utility

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$ and $x_1 \neq x_2$ or slope = $\frac{rise}{run}$ or slope = $\frac{\Delta y}{\Delta x} = \frac{change\ in\ y}{change\ in\ x}$

Vertical lines (parallel to the y-axis) have the same x values, therefore slope is undefined

Horizontal lines(parallel to the x-axis) have the same y values, so slope is zero

When the slope of a line is positive, the line slants upward from left to right.

When the slope of a line is negative, the line slants downward from left to right.

Slope – intercept form: $y = mx + b$

Equation of a vertical line: $x = a$ Equation of a horizontal line: $y = b$

Point-slope form: If $(x_1, y_1)$ is a given point on a line whose slope is m, the point-slope form is: $y - y_1 = m(x - x_1)$

General or Standard form of a line: $Ax + By = C$, where A, B, and C are real numbers and A and b are not both zero

Parallel lines: Two nonvertical lines are parallel if and only if their slopes are equal and they have different y-intercepts.

Perpendicular lines: Two nonvertical lines are perpendicular if and only if the product of their slopes is -1. (Or we say the slopes of the two lines are the negative reciprocals)

1). Plot the following points in the xy-plane. Label each point on the graph. Tell in which quadrant or on which coordinate axis each point lies.

a). A = ( -3, 2) _____

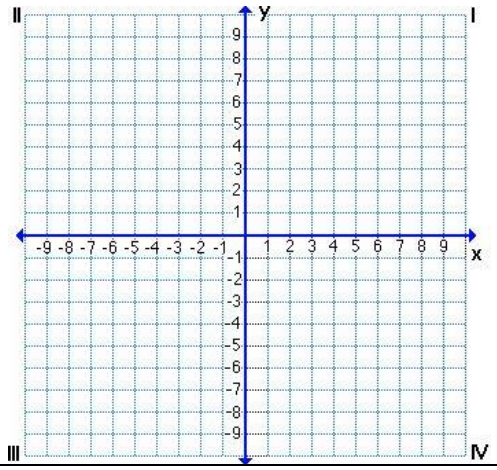
b). B = (6, 0) _____

c). C = ( - 2, - 2) _____

d). D = (6,5) _____

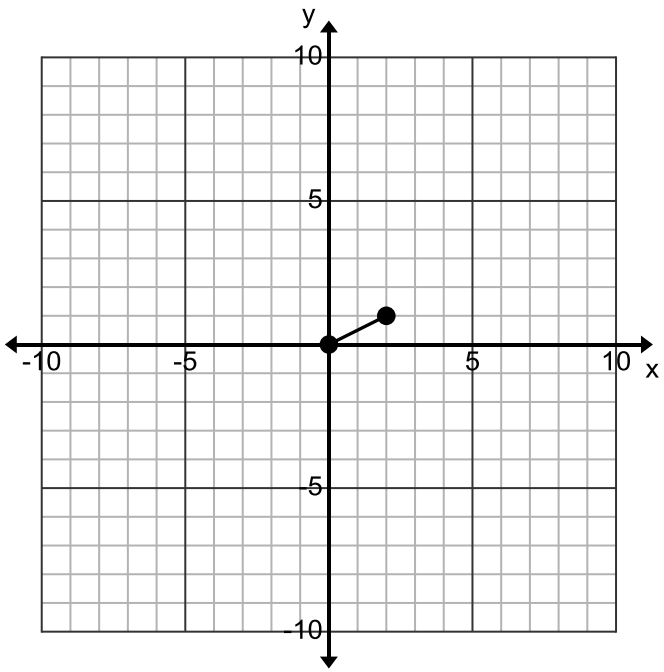
e). E = (0, - 3) _____

f). F = (6, - 3) _____



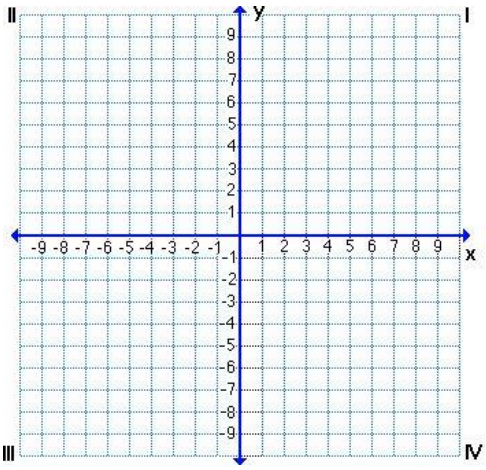

Find the distance between the two points on the graph. Show all work.

2).



3). Plot each point and form the triangle ABC, Verify that the triangle is a right triangle and find the area.

A = (-2,5) B = (1,3) C = (-1, 0)




4). Find the midpoint of the line segment joining $P_1$ and $P_2$. Show all work.

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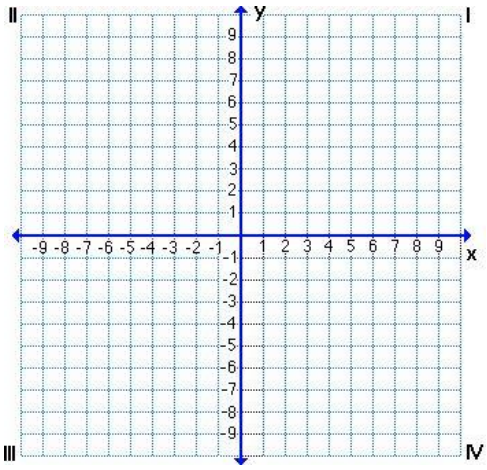
$P_1$ = (3 , -4) $P_2$ = (5,4)

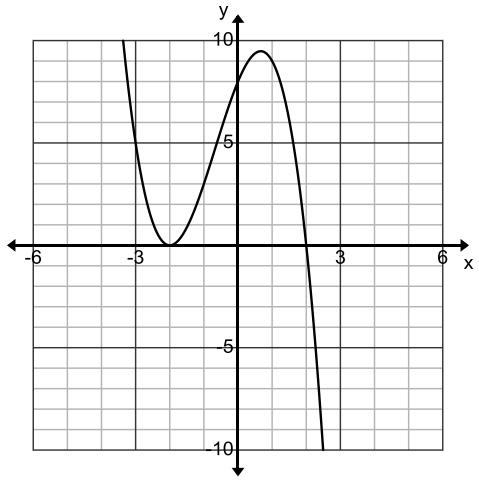
5). Tell whether the given points are on the graph of the equation. Show all work.

Equation: $y = x^4 - \sqrt{x}$ Points: (0,0); (1,1); (-1,0)

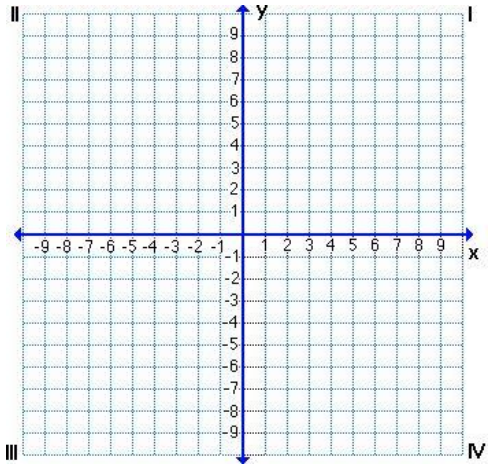
6). Graph the equation $y = 2x + 8$ on the coordinate axis below. Find at least three points on the line and label those points.



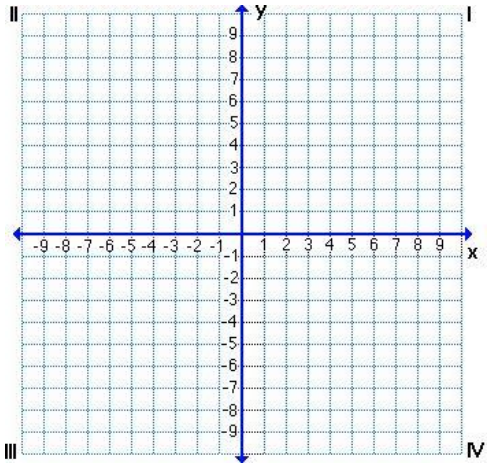
7). The graph of an equation is given below. List <u>all intercepts</u> of the graph.



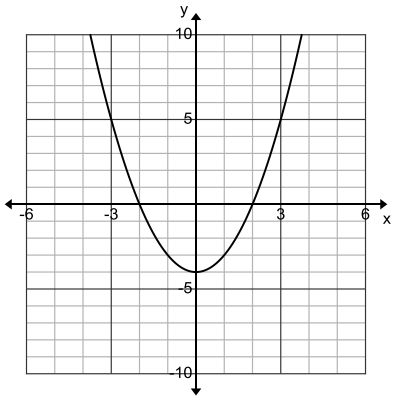

8). Graph the equation $y = x^2 - 1$ on the coordinate axis below. Find at least five points. Those five points should contain the x and y intercepts.Label those points.



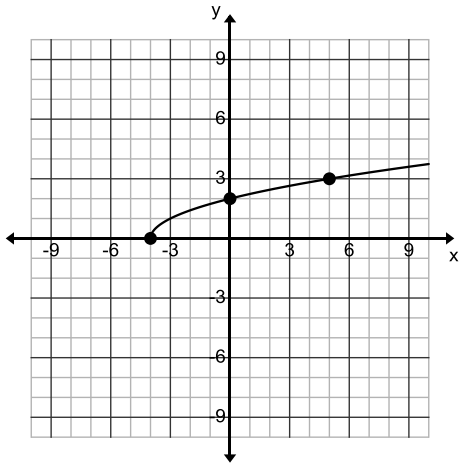

9). Find the x and y-intercepts of $y = 3x - 9$. Plot these points on the graph below and connect them. Label the intercepts.



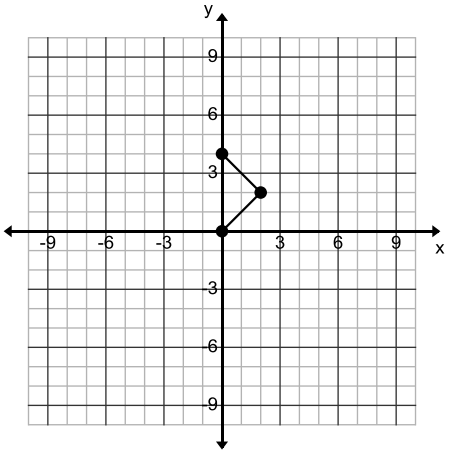
10). The graph of an equation is given, a) Find the intercepts b). Indicate whether the graph is symmetric with respect to the x-axis, y-axis or origin.




11). Draw a complete graph so that it has the type of symmetry indicated x-axis




12). Draw a complete graph so that it has the type of symmetry indicated y-axis



Solve each of the following equations. Show all work

13). $2(3 + 2x) = 3(x - 4)$

14). $8x - (2x + 1) = 3x - 13$

15). $\frac{x+1}{3} + \frac{x+2}{7} = 5$

16). $(x +7)(x -1) = (x +1)^2$

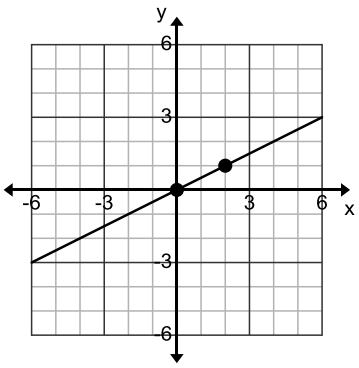
17). $x^3 + x^2 - 4x - 4 = 0$

18). $\sqrt{x + 1} = 4$

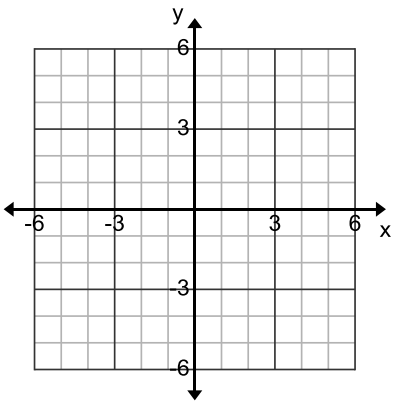
19). $5x^2 = 13x + 6$

20). $\frac{2}{x+2} + \frac{3}{x-1} = \frac{-8}{5}$

21). From the following graph determine the slope of the line

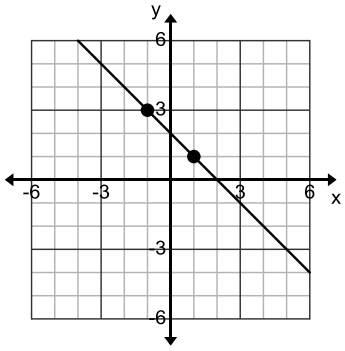



22) Plot the pair of points given and determine the slope of the line containing both points. Connect the points to make the line: (-2,3) and (2,1)

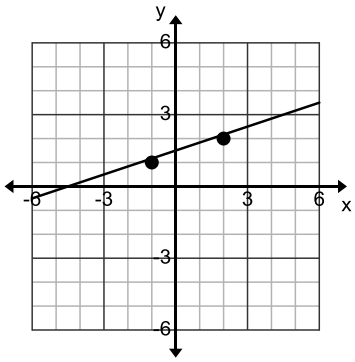



Determine the equations of the line that is graphed below. Your answer can be either in slope-intercept form or standard form.

23).




24).




25). Find an equation for the line with the given properties. Express your answer either in slope intercept form or general form. slope = 3; containing the point (-2,3)

26). Find an equation for the line with the given properties. Express your answer either in slope intercept form or general form. slope = -3; y-intercept = 3

27). Find an equation for the line with the given properties. Express your answer either in slope intercept form or general form.

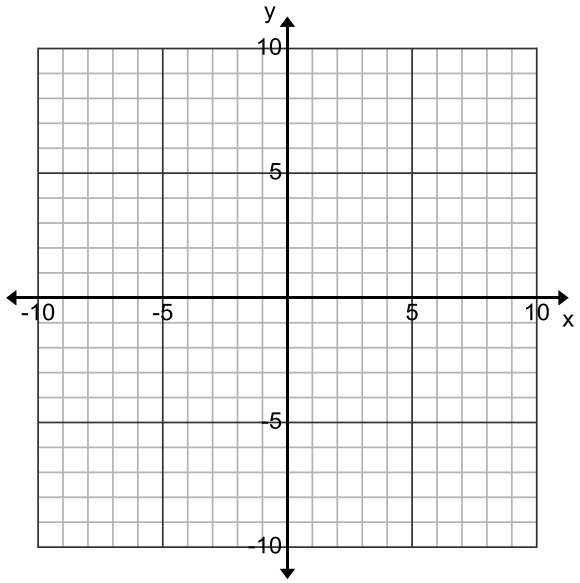
Parallel to the line y = 2x ; containing the point (-1,2)

28). Find an equation for the line with the given properties. Express your answer either in slope intercept form or general form.

Perpendicular to the line $y = \frac{1}{2}x + 4$; containing the point (1,-2)

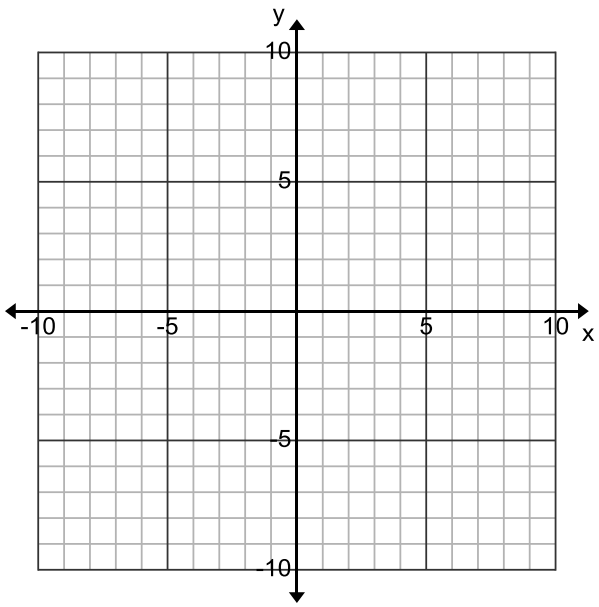
29). Find the slope and the y-intercept of the following line. Graph the line on the coordinate axis below.

3x + 2y = 6 slope = _____ y -intercept = _____



30). Find the x and y-intercepts of the line, then graph it on the coordinate axis

6x - 4y = 24 x-intercept = _____ y-intercept = _____




Evaluate the following if x = -2 and y = 3

31). $\frac{3x + 2y}{2+y}$ =

32). -2x + xy =

Find the value of each express in if x = 3 and y = -2

33). $|3x + 2y|$ =

34). $3|x| + 2|y|$ =

Simplify each of the following. Your answers should not have any negative exponents and answers should not be in decimal form.

35). $(-4)^2$ =

36). $-4^2$ =

37). $3^{-6} \cdot 3^4$ =

38). $(3^{-2})^{-1}$ =

37). $\sqrt{(-4)^2}$ =

40). $(8x^3)^2$ =

41). $\frac{x^2y^3}{xy^4}$ =

42). $\frac{(-2)^3x^4(yz)^4}{3^2xy^3z}$ =

43). $\frac{4x^{-2}(yz)^{-1}}{2^3x^4y}$ =

44). $\left(\frac{5x^{-2}}{6y^{-1}}\right)^{-3}$ =

Add, subtract or multiply as indicated. Express your answer as a single polynomial in standard form:

45). $(x^3 + 3x^2 + 2) + (x^2 - 4x + 4)$ =

46). $(x^3 - 2x^2 + 5x + 10) - (2x^2 - 4x + 3)$ =

47). $6(x^3 + x^2 - 3) - 4(2x^3 - 3x^2)$ =

48). $x(x^2 + x - 4)$ =

49). $(x + 3)(x + 5)$ =

50). $(x + 7)(x - 7)$ =

51). $(2x - 3)^2$ =

52). $(2x + 1)^3$ =

Complete each of the following by long division:

53). $(4x^3 - 3x^2 + x + 1) \div (x + 2)$ =

Factor each of the following polynomials completely. If the polynomial cannot be factor say that it is prime.

54). $x^2$ - 36 =

55). $x^2$ + 11x + 10 =

56). $4x^2$ - 8x+ 32 =

57). $y^4 + 11y^3 + 30y^2$ =

58). $4y^2$ - 16y + 15 =

58). x(x + 3) - 6(x + 3) =

Simplify each of the following rational expressions:

59). $\frac{3x+9}{x^2-9}$ =

60). $\frac{24x^2}{12x^2-6x}$ =

61). $\frac{y^2-25}{2y^2-8y-10}$ =

Perform the following operations:

62). $\frac{3x+6}{5x^2} \bullet \frac{x}{x^2-4}$ =

63). $\frac{12}{x^2+x} \bullet \frac{x^3+1}{4x-2}$ =

64). $\frac{\frac{8x}{x^2-1}}{\frac{10x}{x+1}}$ =

65). $\frac{\frac{4-x}{4+x}}{\frac{4x}{x^2-16}}$ =

66). $\frac{x^2}{2x-3} - \frac{4}{2x-3}$ =

67). $\frac{x}{x-3} - \frac{x+1}{x^2+5x-24}$ =