Notes Review #2 Pre-calculus **Lines in the Plane**

Slope – rate of change of a secant line

The formula for finding the slope of a line is: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$

A **vertical line** is **undefined** slope. A vertical line occurs when $x_1 = x_2$.
A **horizontal line** has a slope of **zero** and occurs when $y_1 = y_2$.

Point-slope form – equation of a line that passes through the point (x_1, y_1) and has slope m.
The point-slope formula is: $y - y_1 = m (x – x_1)$

y-intercept – (of a non-vertical line) where line intersects the y-axis.

Slope-intercept form of a line $y = mx + b$

Standard Form of a line $Ax + By = C$ where A, B are not both 0.

General Form of a line $Ax + By - C = 0$ where A, B are not both 0 (no fractions and A needs to be a positive number.

Vertical Line equation $x = a$

Horizontal line equation $y = b$

Parallel lines – slopes are equal.

Two nonvertical lines are perpendicular, if and only if, their slopes m_1 and m_2 are opposite reciprocals. That is if and only if $m_1 = -\frac{1}{m_2}$

Solving Equations Graphically, Numerically, Algebraically

Quadratic Equations are in the form $ax^2 + bx + c = 0$ where $a \neq 0$

How to solve quadratic equations.

1. Factor then set each expression equal to 0 and solve. If a●b=O then a=0 or b= 0
2. Find the x-intercepts by using a graphing calculator.
3. Complete the square, then solve.

$$x^2 + bx + \left(\frac{b}{2}\right)^2 = c + \left(\frac{b}{2}\right)^2$$

$$\left(x + \frac{b}{2}\right)^2 = c + \frac{b^2}{4}$$

4. Use the quadratic formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

When solving quadratic Equations round to three decimal places unless otherwise noted.

5. Given two expressions equal to each other you may solve this by putting one expression into y_1 and the other expression into y_2 and find their intersection. The x-coordinate of the intersection is the solution.

6. Absolute value equations: Isolate the absolute value portion of the equation then solve the absolute value portion for both the positive and negative value.

Solving Inequalities algebraically
Solve the inequality in the same manner as an equation **BUT r**emember when you multiply or divide by a negative number when solving an inequality you must reverse the inequality sign.
Solving Absolute value inequalities:
|x|< a Then x is in the interval (-a.a)
|x|< a if and only if –a<x<a
If |x|>a then x is in the interval (- ∞, -a) or(a, ∞)
That is |x|> a if and only if x< -a or x>a

Complex Numbers

$i = \sqrt{-1}$ i^2= -1
A complex number is any number that can be written in the form *a + bi* where *a* and *b* are real numbers. The real number *a* is the real part of the complex number. The real number *b* is the imaginary part. *a+bi* is the standard form of a complex number
Sum: (*a + bi*) + (*c+di*)= (*a+c*) + (*bi+di*)
Difference: (*a + bi*) - (*c+di*)= (*a-c*) + (*bi-di*)
Additive Inverse: (*a + bi*) is -(*a+bi*) = -*a – bi*
Complex Conjugate of the complex number: If the complex number is *a + bi* then the conjugate is *a – bi*