Notes for Test 2

(2.1 – 2.4, 7.1, 3.1 – 3.4)

You may NOT use these notes for the test, but they should help you study.

- **Formulas to Know (2.1)**
  - Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
  - Midpoint Formula: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ This should be written as an ordered pair.
  - Know how to determine if points form a parallelogram

- **Circles (2.2)**
  - Standard Form: $(x-h)^2 + (y-k)^2 = r^2$

    Remember that when you pull the center (h, k) out of standard form, you have to change the signs!!!
  - General Form: $x^2 + y^2 + ax + by + c = 0$
  - You need to be able to get from General Form to Standard Form (completing the square process)
  - Intercepts:
    - x-intercept: set $y = 0$
    - y-intercept: set $x = 0$

- **Equations of Lines (2.3 and 2.4)**
  - Special cases:
    - $y = 4$ (or any number) is a horizontal line with slope $m = 0$
    - $x = -\frac{2}{3}$ (or any number) is a vertical line with slope = undefined
  - If directions say "Find an equation of a line," you must start by using the point-slope formula: $y - y_1 = m(x - x_1)$
  - To find a slope given two points $m = \frac{y_2 - y_1}{x_2 - x_1}$
  - Forms of lines - Pay attention to the directions. Be sure to use the correct form!
    - Point-slope Form: $y - y_1 = m(x - x_1)$
    - Slope Intercept Form: $y = mx + b$
    - Standard Form: $Ax + By = C$ (A must be a positive number)
  - Parallel lines have the EXACT same slope
  - Perpendicular lines have slopes that are opposite in sign and are reciprocals of each other
  - Intercepts:
    - x-intercept: set $y = 0$
    - y-intercept: set $x = 0$
  - You must be able to graph a line

- **Systems of Equations (7.1)**
  - 2-by-2 systems, use the elimination method
  - 2-by-2 systems, use the substitution method
  - Know how to set up a 2-by-2 system from a word problem

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(2.1 – 2.4, 7.1, 3.1 – 3.4)

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- **Functions (3.1 and 3.2)**
  - Know the difference between a polynomial, rational, and root functions
  - Finding the domain (without a graph)
    - Denominator of a fraction cannot equal 0 ($\neq 0$)
    - Even roots must be positive (≥ 0)
    - If there is an even root in the denominator, the root must be positive and cannot be 0 (>0)
    - Be sure to express in interval notation
  - Finding the domain and range (with a graph)
    - Domain is the set of x-values (how far left and right the graph goes)
    - Range is the set of y-values (how far down and up the graph goes)
    - Be sure to express in interval notation
  - Intervals of increasing, decreasing, and constant
    - Use only the x-values of the starting and stopping point
    - ALWAYS use parenthesis when writing the interval notation
  - Be able to determine if a function is even, odd, or neither
    - Even (with a graph) folds perfectly on the y-axis
    - Even (without a graph) set $x = -x$ and simplify. If you get the original equation back, then it is even.
    - Odd (with a graph) rotate upside down and it is still the same as the original
    - Odd (without a graph) set $x = -x$ and $y = -y$ and simplify. If you get the original equation back, then it is odd.
    - If none of the above situations are true, the graph is neither even nor odd.

- **Transformations (3.3 and 3.4)**
  - Horizontal Shifts (number is inside parenthesis – shift opposite direction of the sign)
    - Shift Left $y = (x+3)^2$ number is positive
    - Shift Right $y = (x-3)^2$ number is negative
  - Vertical Shift (number is outside parenthesis – shift same direction of the sign)
    - Shift Up $y = x^2 + 3$ number is positive
    - Shift Down $y = x^2 - 3$ number is negative
  - Horizontal Stretches/Compressions (number is inside parenthesis)
    - Stretch $y = \left(\frac{1}{5}x\right)^2$ number is smaller than 1 (wider)
    - Compression $y = (5x)^2$ number is larger than 1 (skinnier)
  - Vertical Stretches/Compressions (number is outside parenthesis)
    - Stretch $y = 5x^2$ number is larger than 1 (skinnier, but taller)
    - Compression $y = \frac{1}{5}x^2$ number is smaller than 1 (wider, but shorter)
  - Reflections
    - About x-axis – multiply everything by -1
    - About y-axis – change x to a $-x$