Math1010
Formulas to Memorize

Lines/2d Coordinates:

Distance formula (to find distance between two points (x_1, y_1) and (x_2, y_2))

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

Midpoint formula (to find midpoint between two points (x_1, y_1) and (x_2, y_2))

$$\text{midpoint} = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

Slope formula (to find slope of line between two points (x_1, y_1) and (x_2, y_2))

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-Intercept form of a line, where m = slope and (0, b) is y-intercept of the line.

$$y = mx + b$$

Point-slope form of a line, given the point (x_1, y_1) and slope m.

$$y - y_1 = m(x - x_1)$$

Parallel slope—if two lines are parallel, their slope is the same.
Perpendicular slope—if two lines are perpendicular and one line has slope m, then the other line has slope $\frac{-1}{m}$.

Graphing—compared to base graph y = f(x), where c > 0

1. Shifts: h(x) = f(x) + c ==> shifts graph up by c
   h(x) = f(x) – c ==> shifts graph down by c
   h(x) = f(x + c) ==> shifts graph left by c
   h(x) = f(x – c) ==> shifts graph right by c
2. Reflections: g(x) = -f(x) ==> vertical reflection
   g(x) = f(-x) ==> horizontal reflection

Domain:

1. For $\frac{f(x)}{g(x)}$, $g(x) \neq 0$
2. For $\sqrt{f(x)}$, $f(x) \geq 0$
3. For $\log_a f(x)$, $f(x) > 0$

Rules of Exponents:

$$a^m \cdot a^n = a^{m+n}$$
$$\frac{a^m}{a^n} = a^{m-n}$$
$$(ab)^m = a^m b^m$$
$$(a^m)^n = a^{mn}$$
$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$
$$a^0 = 1, \text{ if } a \neq 0$$
$$a^{-m} = \frac{1}{a^m}$$
$$\left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^m$$
$$a^{\frac{1}{n}} = \sqrt[n]{a}$$
$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$
$$\sqrt[n]{a^n} = a, \text{ if n is odd}$$
$$\sqrt[n]{a^n} = |a|, \text{ if n is even}$$

Polynomials:

Difference of Two Squares $u^2 - v^2 = (u+v)(u-v)$
Factoring/Multiplying out squares: $(u+v)^2 = u^2 + 2uv + v^2$ and $(u-v)^2 = u^2 - 2uv + v^2$

Quadratic formula—used to solve a quadratic equation of the form $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Logarithms:

Definition-- $\log_a x = y$ **<==>** $a^y = x$

Properties:

1. $\log_a (xy) = \log_a x \log_a y$
2. $\log_a \left(\frac{x}{y}\right) = \log_a x - \log_a y$
3. $\log_a (x^m) = m \log_a x$