College Algebra Exam Formulas Sheet

For equalities involving absolute value:

$\lvert 3x+5\rvert = 4$ *becomes* $3x+5=4$ *or* $3x+5=-4$ *(drop)* *(drop/sign flip)*	$\lvert 3x+5\rvert = 0$ *becomes* $3x+5=0$	$\lvert 3x+5\rvert = -4$ *has* $\boxed{\text{No Solution}}$

For inequalities involving absolute value:

…**positive**, rewrite as a compound or combined inequality without absolute value bars (see examples below)

> *or* ≥	$\lvert 3x+5\rvert > 4$ *becomes* $3x+5>4$ *or* $3x+5<-4$ *(drop)* *(drop/double sign flip)*	$\lvert 3x+5\rvert \geq 7$ *becomes* $3x+5\geq 7$ *or* $3x+5\leq -7$ *(drop)* *(drop/double sign flip)*
< *or* ≤	$\lvert 3x+5\rvert < 9$ *becomes the combined inequality* $-9<3x+5<9$	$\lvert 3x+5\rvert \leq 2$ *becomes the combined inequality* $-2\leq 3x+5\leq 2$

…**zero**, rewrite as an equality or inequality, or state the solution as "All Real Numbers" or "No Solution" (see examples below)

> *or* ≥	$\lvert 3x+5\rvert > 0$ *becomes the inequality* $3x+5\neq 0$	$\lvert 3x+5\rvert \geq 0$ *has the solution* $\boxed{\text{All Real Numbers}}$
< *or* ≤	$\lvert 3x+5\rvert < 0$ *has* $\boxed{\text{No Solution}}$	$\lvert 3x+5\rvert \leq 0$ *becomes the equality* $3x+5=0$

…**negative**, state the solution as "All Real Numbers" or "No Solution" (see examples below)

> *or* ≥	$\lvert 3x+5\rvert > -4$ *has the solution* $\boxed{\text{All Real Numbers}}$	$\lvert 3x+5\rvert \geq -7$ *has the solution* $\boxed{\text{All Real Numbers}}$
< *or* ≤	$\lvert 3x+5\rvert < -9$ *has* $\boxed{\text{No Solution}}$	$\lvert 3x+5\rvert \leq -2$ *has* $\boxed{\text{No Solution}}$

The distance between two points, (x_1, y_1) and (x_2, y_2), is $d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

The midpoint of the line segment whose endpoints are (x_1, y_1) and (x_2, y_2) is the point with coordinates $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Some equation forms of a line:

$y = mx + b$ $\qquad$ $y - y_1 = m(x - x_1)$ $\qquad$ $\mathrm{Ax} + \mathrm{By} = \mathrm{C}$

Given a line passing through points (x_1, y_1) and (x_2, y_2), the slope m of the line is $m = \frac{rise}{run} = \frac{y_2-y_1}{x_2-x_1}$ as long as $x_2 \neq x_1$

The average rate of change of a function from a to b is $\frac{f(b)-f(a)}{b-a}$

The vertex form of a parabola is $y = f(x) = a(x-h)^2 + k$
The standard form of a parabola is $y = ax^2 + bx + c$
The vertex of a parabola in standard form is the point $\left(-\frac{b}{2a},\ c - \frac{b^2}{4a}\right)$

The Law of Exponents:
Given $a > 0$ with $a \neq 1$: If $a^u = a^v$, then $u = v$.

SUMMARY Properties of Logarithms

In the list that follows, a, b, M, N, and r are real numbers. Also, $a > 0$, $a \neq 1$, $b > 0$, $b \neq 1$, $M > 0$, and $N > 0$.

Definition	$y = \log_a x$ means $x = a^y$	
Properties of logarithms	$\log_a 1 = 0$; $\log_a a = 1$	$\log_a M^r = r \log_a M$
	$a^{\log_a M} = M$; $\log_a a^r = r$	$a^x = e^{x \ln a}$
	$\log_a(MN) = \log_a M + \log_a N$	If $M = N$, then $\log_a M = \log_a N$.
	$\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$	If $\log_a M = \log_a N$, then $M = N$.
Change-of-Base Formula	$\log_a M = \frac{\log_b M}{\log_b a}$	

The compound interest formula states that $F = P\left(1 + \frac{r}{n}\right)^{nt}$

The continuously compounded interest formula states that $F = Pe^{rt}$

The exponential law states that an amount A varies with time t according to the function $A(t) = A_0 e^{kt}$
As long as the start time is 0, the value of k can be determined using the adder a and either the multiplier m or the divider d:

$\boxed{k = \frac{\ln m}{a}}$ or $\boxed{k = \frac{\ln(1/d)}{a}}$