Math 1300 Formulas

Rules for exponents

1. $a^0 = 1$
2. $a^{-n} = \frac{1}{a^n}$
3. $a^{\frac{1}{n}} = \sqrt[n]{a}$
4. $a^{\frac{m}{n}} = \sqrt[n]{a^m}$
5. $a^m a^n = a^{m+n}$
6. $\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
7. $(a^m)^n = a^{mn}$
8. $(ab)^n = a^n b^n$
9. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$
10. For $b \neq 1$, $b^x = b^y$ means $x = y$.

Absolute Value Equations

To solve the equation $|x| = C$, use the following properties:
If C is positive, then $|x| = C$ is equal to $x = \pm C$.
If C is negative, then $|x| = C$ has no solution.
If C is zero, then the solution of $|x| = C$ is $x = 0$.

The Distance and Midpoint Formula

For any two points $A\ (x_1, y_1)$ and $B\ (x_2, y_2)$the distance between them is given by

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

The midpoint of the line segment joining A and B is $M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

Lines, Slopes, and Intercepts

You can find the slope of a line between two points (x_1, y_1) and (x_2, y_2) by using this formula

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

Lines with slope equal to 0 are **horizontal** lines.

Lines with undefined slope are **vertical** lines.

To find ***x*-intercept** set $y = 0$, solve for x. Point form:$(x - int, 0)$.

To find ***y*-intercept** set $x = 0$, solve for y. Point form:$(0, y - int)$.

Pythagorean Theorem

$a^2 + b^2 = c^2$, where a and b are legs, and c is the hypotenuse, i.e. side opposite the right angle.

Equations of a Line

1. The **standard form** of a linear equation is $Ax + By = C$, where A and B cannot both be equal to 0.
2. The **point-slope form** of a linear equation is given by $y - y_1 = m(x - x_1)$, where m is the slope and the line passes through the point (x_1, y_1).
3. The **slope-intercept form** of a linear equation is given by $y = mx + b$ where m is the slope and b is the y-intercept.

Parallel and Perpendicular Lines

Two lines with slopes m_1 and m_2 are **parallel** if and only if $m_1 = m_2$.
Two lines with slopes m_1 and m_2 are **perpendicular** if and only if $m_1 \cdot m_2 = -1$.

Factoring

$a^2 - b^2 = (a - b)(a + b)$
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$(a - b)^2 = a^2 - 2ab + b^2$
$(a + b)^2 = a^2 + 2ab + b^2$