

Review of Algebra

Special Factorizations

$$\begin{aligned}x^2 - y^2 &= (x + y)(x - y) \\x^3 - y^3 &= (x - y)(x^2 + xy + y^2) \\x^3 + y^3 &= (x + y)(x^2 - xy + y^2)\end{aligned}$$

Quadratic Formula

The solution to the quadratic equation $ax^2 + bx + c = 0$ where $a \neq 0$ is

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

Exponents

Let n be a positive integer and $a \neq 0$. Then

$$\begin{array}{lll}a^0 = 1 & a^{-x} = \frac{1}{a^x} & a^{1/n} = \sqrt[n]{a} \\a^x \cdot a^y = a^{x+y} & \frac{a^x}{a^y} = a^{x-y} & a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m \\a^x \cdot b^x = (ab)^x & \left(\frac{a}{b}\right)^x = \frac{a^x}{b^x} & \sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b} \\(a^x)^y = a^{xy} & a^{1/2} = \sqrt{a} & \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, b \neq 0\end{array}$$

Lines

Slope of a line through the points (x_1, y_1) and (x_2, y_2)	$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$
Slope-intercept equation of a line	$y = mx + b$
Point-slope equation of a line	$y - y_1 = m(x - x_1)$
General linear equation	$Ax + By = C$