

# Algebra Review

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- **Intervals**

$$[a, b] = a \leq x \leq b$$

$$(a, b) = a < x < b$$

$$[a, b) = a \leq x < b$$

$$[a, \infty) = a \leq x < \infty$$

$$(a, \infty) = a < x < \infty$$

$$(-\infty, b) = -\infty < x < b$$

- **Fractions**

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

$$\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$$

$$\frac{b}{a} \times \frac{d}{c} = \frac{bd}{ac}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$$

- **Power Rules**

$$a^n = \overbrace{a \times a \times \cdots \times a}^{n\text{-times}}, \text{ for a positive integer } n$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

$$a^n \times a^m = a^{n+m}$$

$$a^n \div a^m = a^{n-m}$$

$$(a^n)^m = a^{nm} = (a^m)^n$$

$$(ab)^n = a^n b^n$$

$$a^n = a^m \implies m = n$$

$$a^n = b^n \not\implies a = b$$

- **Quadratic Formula**

$$ax^2 + bx + c = 0 \implies x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- **Foiling**

$$(ax + b)(cx + d) = acx^2 + (ad + bc)x + bd$$

- **Misc. Formulae**

$$(ax + b)^2 = a^2x^2 + 2abx + b^2$$

$$(ax - b)^2 = a^2x^2 - 2abx + b^2$$

$$(ax + b)^3 = a^3x^3 + 3a^2bx^2 + 3ab^2x + b^3$$

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

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

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