

FORMULAS/EQUATIONS

Distance Formula

If $P_1 = (x_1, y_1)$ and $P_2 = (x_2, y_2)$, the distance from P_1 to P_2 is

$$d(P_1, P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Standard Equation of a Circle

The standard equation of a circle of radius r with center at (h, k) is

$$(x - h)^2 + (y - k)^2 = r^2$$

Slope Formula

The slope m of the line containing the points $P_1 = (x_1, y_1)$ and $P_2 = (x_2, y_2)$ is

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{if } x_1 \neq x_2$$

$$m \text{ is undefined} \quad \text{if } x_1 = x_2$$

Point-Slope Equation of a Line

The equation of a line with slope m containing the point (x_1, y_1) is

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

Slope-Intercept Equation of a Line

The equation of a line with slope m and y -intercept b is

$$y = mx + b$$

Quadratic Formula

The solutions of the equation $ax^2 + bx + c = 0$, $a \neq 0$, are

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

If $b^2 - 4ac > 0$, there are two unequal real solutions.

If $b^2 - 4ac = 0$, there is a repeated real solution.

If $b^2 - 4ac < 0$, there are two complex solutions that are not real.

GEOMETRY FORMULAS

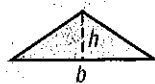
Circle



r = Radius, A = Area, C = Circumference

$$A = \pi r^2 \quad C = 2\pi r$$

Triangle



b = Base, h = Altitude (Height), A = area

$$A = \frac{1}{2}bh$$

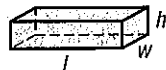
Rectangle



l = Length, w = Width, A = area, P = perimeter

$$A = lw \quad P = 2l + 2w$$

Rectangular Box



l = Length, w = Width, h = Height, V = Volume, S = Surface area

$$V = lwh \quad S = 2lw + 2lh + 2wh$$

Sphere



r = Radius, V = Volume, S = Surface area

$$V = \frac{4}{3}\pi r^3 \quad S = 4\pi r^2$$

Right Circular Cylinder



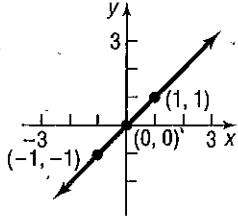
r = Radius, h = Height, V = Volume, S = Surface area

$$V = \pi r^2 h \quad S = 2\pi r^2 + 2\pi r h$$

LIBRARY OF FUNCTIONS

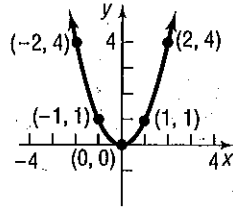
Identity Function

$$f(x) = x$$



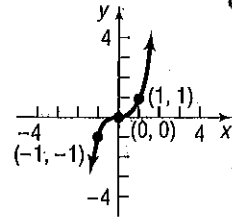
Square Function

$$f(x) = x^2$$



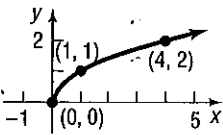
Cube Function

$$f(x) = x^3$$



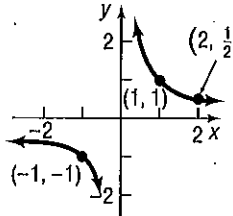
Square Root Function

$$f(x) = \sqrt{x}$$



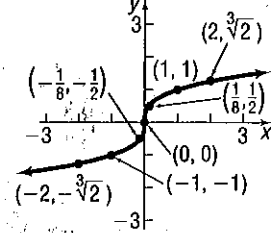
Reciprocal Function

$$f(x) = \frac{1}{x}$$



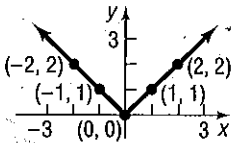
Cube Root Function

$$f(x) = \sqrt[3]{x}$$



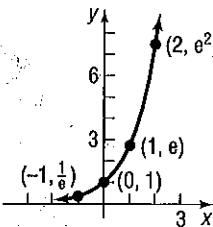
Absolute Value Function

$$f(x) = |x|$$



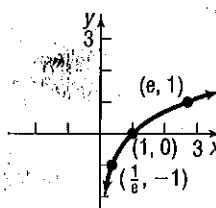
Exponential Function

$$f(x) = e^x$$



Natural Logarithm Function

$$f(x) = \ln x$$



FUNCTIONS

Constant Function

$$f(x) = b$$

Linear Function

$$f(x) = mx + b, \text{ where } m \text{ is the slope and } b \text{ is the } y\text{-intercept}$$

Quadratic Function

$$f(x) = ax^2 + bx + c, a \neq 0$$

Polynomial Function

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

Rational Function

$$R(x) = \frac{p(x)}{q(x)} = \frac{a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0}{b_m x^m + a_{m-1} x^{m-1} + \dots + b_1 x + b_0} \quad q(x) \neq 0$$

Exponential Function

$$f(x) = a^x, a > 0, a \neq 1$$

Logarithmic Function

$$f(x) = \log_a x, a > 0, a \neq 1$$