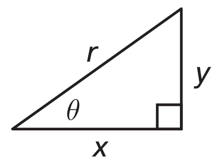
Algebra II Reference Page

Trigonometric Functions

$\sin\theta = \frac{y}{r}$, $\csc\theta = \frac{r}{y}$

$\cos\theta = \frac{x}{r}$, $\sec\theta = \frac{r}{x}$

$\tan\theta = \frac{y}{x}$, $\cot\theta = \frac{x}{y}$



$r = \sqrt{x^2 + y^2}$

Logarithm Properties

$\log_b MN = \log_b M + \log_b N$

$\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b x = y \Leftrightarrow x = b^y$

Arithmetic and Geometric Sequences and Series

$a_1 = 1^{st}$ term r = common ratio d = common difference

$a_n = n^{th}$ term n = number of terms in series

Arithmetic Sequence: $a_n = a_1 + (n-1)d$ Geometric Sequence: $a_n = a_1 r^{n-1}$

Sum of a Finite Arithmetic Series: $S_n = \frac{n(a_1 + a_n)}{2}$ or $S_n = \frac{1}{2}n\left[2a_1 + (n-1)d\right]$

Sum of a Finite Geometric Series: $S_n = \frac{a_1(1-r^n)}{1-r}$, $r \neq 1$

Sum of an Infinite Geometric Series: $S = \frac{a_1}{1-r}$ where $|r| < 1$

Combinations

$${}_nC_r = \frac{n!}{r!(n-r)!}$$

Permutations

$${}_nP_r = \frac{n!}{(n-r)!}$$

Binomial Theorem

$$(a+b)^n = \sum_{r=0}^{n} \binom{n}{r} a^{n-r} b^r$$

Quadratic Formula

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

$$y = ax^2 + bx + c$$

Interest Formulas

Compound interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Continuous compound interest: $A = Pe^{rt}$

P = present value

A = future value

r = annual interest rate

t = time in years

n = frequency of compounding per year

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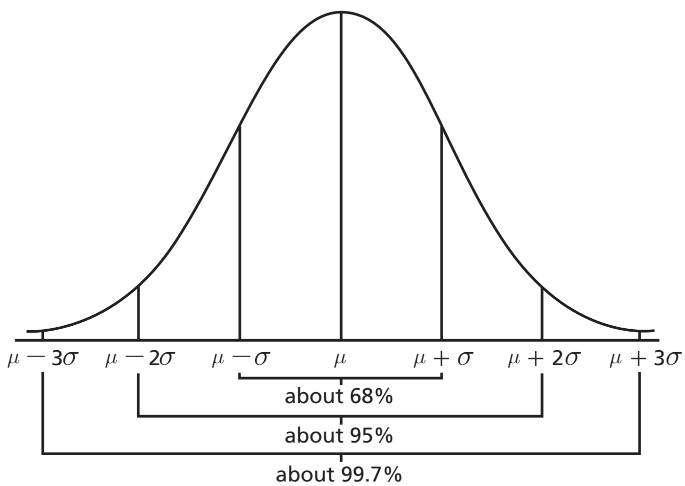
Conic Sections – Standard Equations

Parabola	$y = a(x-h)^2 + k$	or	$x = a(y-k)^2 + h$
	$(y-k)^2 = 4p(x-h)$	or	$(x-h)^2 = 4p(y-k)$
Circle	$(x-h)^2 + (y-k)^2 = r^2$		
Ellipse	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	or	$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$
Hyperbola	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	or	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Normal Curve Distribution



Standard Deviation

The standard deviation , σ, for values $x_1, x_2, x_3, \ldots, x_n$ with mean μ is determined by the following:

$$\sigma = \sqrt{\frac{(x_1-\mu)^2 + (x_2-\mu)^2 + \ldots + (x_n-\mu)^2}{n}}$$

Probability Formulas

Exclusive

$$P(A \text{ or } B) = P(A) + P(B)$$

Inclusive

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Independent

$$P(A \text{ and } B) = P(A) \bullet P(B)$$

Dependent

$$P(A \text{ and } B) = P(A) \bullet P(B|A)$$

Conditional

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$$

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Cramer's Rule for Solving a System of Linear Equations

For a 2×2 System:

$$a_1x + b_1y = c_1$$
$$a_2x + b_2y = c_2$$

$$x = \frac{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}} \qquad y = \frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}}$$

For a 3×3 System:

$$a_1x + b_1y + c_1z = d_1$$
$$a_2x + b_2y + c_2z = d_2$$
$$a_3x + b_3y + c_3z = d_3$$

$$x = \frac{\begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}} \qquad y = \frac{\begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}} \qquad z = \frac{\begin{vmatrix} a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}}$$

Converting Degrees to Radians

Multiply degree measure by $\frac{\pi}{180°}$

Converting Radians to Degrees

Multiply radian measure by $\frac{180°}{\pi}$

Definition of "i"

$$i^2 = -1$$
$$i = \sqrt{-1}$$

Absolute Value of a Complex Number

$$|a + bi| = \sqrt{a^2 + b^2}$$