Definitions and Formulas for Advanced Mathematics

LOGIC

$a \rightarrow b$	a implies b
$a \leftrightarrow b$	a if and only if b
$a \wedge b$	a and b
$a \vee b$	a or b
$\sim a$	not a
$A \cup B$	A union B
$A \cap B$	A intersect B
$\overline{A}$	complement of A
U	universal set
$\{\ \}$	empty set

ALGEBRA

$i = \sqrt{-1}$	imaginary unit
$\overline{z}$	complex conjugate of z
A^{-1}	inverse of matrix A
$\mathbf{v}$	vector v

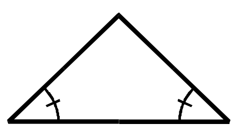
SERIES

$$\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r} \text{ for } |r| < 1$$

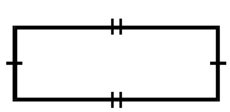
GEOMETRY

$S = 4\pi r^2$	surface area of a sphere
$V = \frac{4}{3}\pi r^3$	volume of a sphere
$\sim$	is similar to
$\cong$	is congruent to

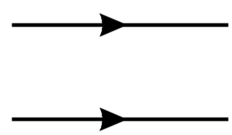
Congruent Angles



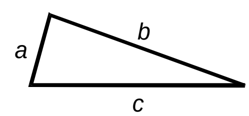
Congruent Sides



Parallel Lines



Hero's or Heron's Formula

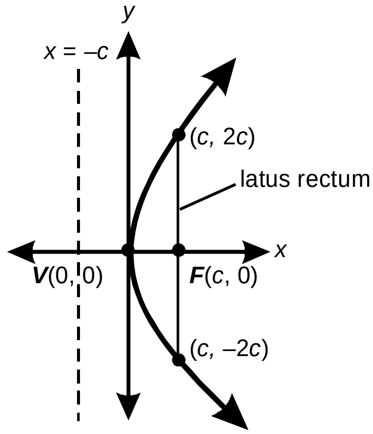


$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

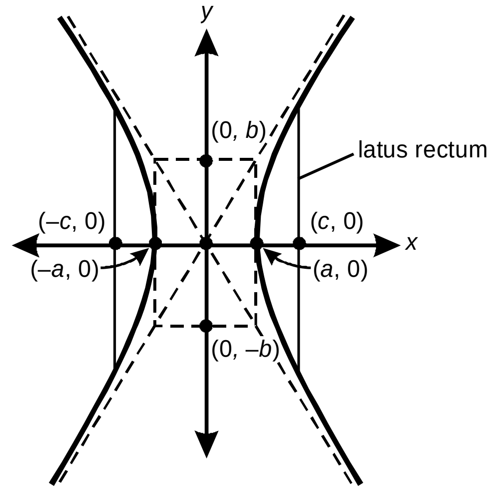
ALGEBRA

Parabola



$$(y - k)^2 = 4c(x - h)$$

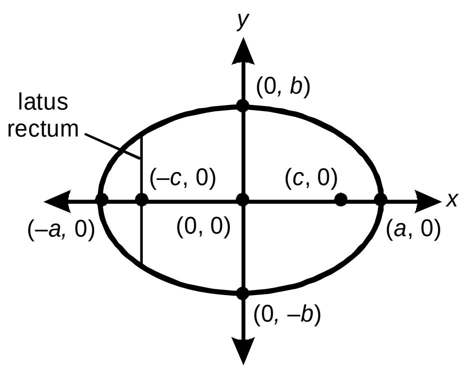
Hyperbola



$$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$$

where $b^2 = c^2 - a^2$

Ellipse



$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

where $c^2 = a^2 - b^2$

Eccentricity of a Conic

$$e = \frac{c}{a}$$

Directrices of a Conic

$$x = \pm\frac{a}{e} = \pm\frac{a^2}{c}$$

Exponential Growth and Decay

$$y = a(1 \pm r)^t$$

TRIGONOMETRY

$$\sin(\theta_1 \pm \theta_2) = \sin\theta_1 \cos\theta_2 \pm \cos\theta_1 \sin\theta_2$$

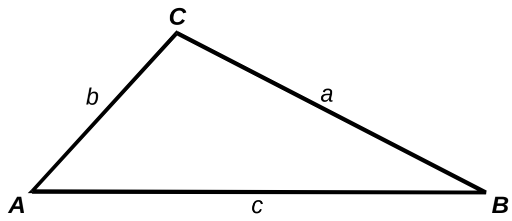
$$\cos(\theta_1 \pm \theta_2) = \cos\theta_1 \cos\theta_2 \mp \sin\theta_1 \sin\theta_2$$

$$\tan(\theta_1 \pm \theta_2) = \frac{\tan\theta_1 \pm \tan\theta_2}{1 \mp \tan\theta_1 \tan\theta_2}$$

$$\sin\frac{\theta}{2} = \pm\sqrt{\frac{1 - \cos\theta}{2}}$$

$$\cos\frac{\theta}{2} = \pm\sqrt{\frac{1 + \cos\theta}{2}}$$

$$\tan\frac{\theta}{2} = \pm\sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}}$$



Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of Cosines

$$c^2 = a^2 + b^2 - 2ab\cos C$$

STATISTICS

standard deviation of a sample mean = $\dfrac{\sigma}{\sqrt{n}}$

NOTES FOR ADVANCED MATHEMATICS TEST

In this examination, assume all functions are real valued functions unless otherwise noted.

In this examination, diagrams may not be drawn to scale.

In this examination, assume all geometry problems imply the use of Euclidean geometry unless otherwise noted.