FIGHT FOR CAMBRIDGE!

PURE MATHEMATICS

Algebraic Series:

$\sum_{r=1}^{n} r =$ $\sum_{r=1}^{n} r^2 =$ $\sum_{r=1}^{n} r^3 =$

Maclaurin's Series:

general expression for Taylor Expansion:

$e^x =$

$\ln(1+x) =$

$\sin x =$

$\cos x =$

$\tan^{-1} x =$

$\sinh x =$

$\cosh x =$

$\tanh^{-1} x =$

$(1+x)^n =$

Hyperbolic Function:

sinhx =

coshx =

$\sinh^{-1} x =$

$\cosh^{-1} x =$

$\tanh^{-1} x =$

1 =

Trigonometric Function:

$\sin 3A \equiv$

$\cos 3A \equiv$

$\sin P + \sin Q \equiv$

$\sin P - \sin Q \equiv$

$\cos P + \cos Q \equiv$

$\cos P - \cos Q \equiv$

If $t = \tan \frac{1}{2}x$ then:

$\sin x =$

$\cos x =$

Area of Sector:

for a circle with angle θ and radius r: A =

in polar form: A =

in parametric form: A =

Length of Sector:

for a circle with angle θ and radius r: C =

in Cartesian form: C =

in polar form: C =

in parametric form: C =

Area of Surface(if rotate with x-axis):

in Cartesian form: S =

in polar form: S =

Matrix:

using Characteristic Equation to find the inverse of M:

Faction:

given y = $\frac{f(x)}{g(x)}$, judge the range of y:

Calculus:

$\mathrm{f}(x)$	$\int \mathrm{f}(x)\,\mathrm{d}x$
$\frac{1}{\sqrt{a^2-x^2}}$	
$\frac{1}{\sqrt{x^2-a^2}}$	
$\frac{1}{\sqrt{a^2+x^2}}$	
$\frac{1}{x^2+a^2}$	
$\frac{1}{x^2-a^2}$	
$\frac{1}{a^2-x^2}$	
$\sec x \tan x$	
$-\operatorname{cosec} x \cot x$	
$-\operatorname{cosec}^2 x$	
$\sec x$	
$\operatorname{cosec} x$	

Vectors about Distance:

(1) the distance from a point P to line, with unit vector $\mathbf{u}$, passing through A:

(2) the distance between lines $\mathbf{r}=\mathbf{a_1}+t\mathbf{b_1}$, $\mathbf{r}=\mathbf{a_2}+s\mathbf{b_2}$:

(3) the distance between a point P and a plane passing through R and Q, and PR is perpendicular to the plane:

(4) the line intersection of two planes, with normal vector $\mathbf{n_1}$ and $\mathbf{n_2}$:

(5) determine whether a line is on the plane, parallel to the plane, or intersect with plane:

(6) find the expression of the intersection of two planes

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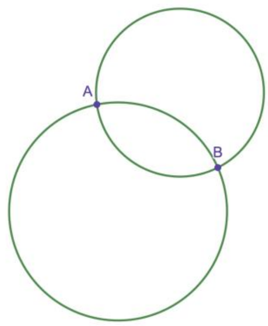
Complex Number Locus:

$given\ that\ Re(B) > Re(A):$



$when\ arg\left(\frac{z-b}{z-a}\right)\ is\ positive\ acute:$

$when\ arg\left(\frac{z-b}{z-a}\right)\ is\ positive\ obtuse:$

$when\ arg\left(\frac{z-b}{z-a}\right)\ is\ negative\ acute:$

$when\ arg\left(\frac{z-b}{z-a}\right)\ is\ negative\ obtuse:$

Differential Equation:

$solve\ \frac{dy}{dx} + P(x)y = Q(x):$

$when\ solving\ a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + cy = 0,\ ax^2 + bx + c = 0\ has\ two\ complex\ roots:$

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MECHANICS

Motion:

change in total energy =

sum of all forces, if not equilibrium =

Momentum:

if there are two objects, with mass m_1 and m_2. initially, their velocity are $\mathbf{u_1}$ and $\mathbf{u_2}$, and after collision, their velocity are $\mathbf{v_1}$ and $\mathbf{v_2}$:

conservation in momentum:

coefficient of restitution:

Centre of Mass:

Triangular lamina: along median from vertex

Solid hemisphere of radius r: from centre

Hemispherical shell of radius r: from centre

Circular arc of radius r and angle 2α: from centre

Circular sector of radius r and angle 2α: from centre

Solid cone or pyramid of height h: from vertex

Elastic Related:

l is the original length, λ is the modulus of elasticity, x is the change in length:

T =

EPE =

change in EPE =

Circular Motion:

for a object with mass m, its circular motion locus has radius r, with radian velocity $\boldsymbol{\omega}$ and velocity $\mathbf{v}$:

$\boldsymbol{\omega}$ =

a =

STATISTICS

Summary Statistics:
for n different x:

$$\mathrm{Var}(x) =$$

Binomial Distribution B(n,p):

$$\mu =$$

$$\sigma^2 =$$

Geometry Distribution Geo(p):

$$\mu =$$

$$\sigma^2 =$$

Poisson Distribution Po(λ):

$$p_r =$$

$$\mu =$$

$$\sigma^2 =$$

Continuous Random Variables:
using integration to express:

$$E(x) =$$

$$\mathrm{Var}(x) =$$

Sampling and Testing, Unbiased Estimation:
there is a sample, consisting of n different x from population:

$$\mu =$$

$$s^2 =$$

Sampling and Testing, Central Limit Theorem:
there are n different samples, and each of them has a mean $\bar{x}$:

$$E(\bar{x}) =$$

$$\mathrm{Var}(\bar{x}) =$$

Probability Density and Cumulative Distribution Function:
if PDF = f(x):

$$\mathrm{CDF} =$$

Probability Generating Function:
using $P(r)$ to represent the probability when $X=r$:

in general form: $G_X(t) =$

$X \sim Geo(p)$: $G_X(t) =$

$X \sim B(n,p)$: $G_X(t) =$

$X \sim Po(\lambda)$: $G_X(t) =$
using $G_X(t)$ to express:

$E(x) =$

$Var(x) =$

$G_{X+Y}(t) =$

$G_{aX+b}(t) =$