



MATHEMATICS

UNITS 3C AND 3D

2013 **FORMULA SHEET**

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Mathematics 3C and 3D Formula Sheet updated January 2013 Ref: 13-090

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Chance and data

For any event Λ and its complement $\overline{\Lambda}$, and event BProbability:

 $(g|V)_{d}(g)_{d} = (V|g)_{d}(V)_{d} = (g \cup V)_{d}$ $(g \cup V)_d - (g)_d + (V)_d = (g \cap V)_d$ $I = (\underline{V})_d + (V)_d$

In a binomial distribution:

Mean: $\mu = n$ and standard deviation: $\sigma = n$:neeM

A confidence interval for the mean of a population is:

 $\frac{u}{Q}z + \underline{x} \geq n \geq \frac{u}{Q}z - \underline{x}$

 $\boldsymbol{\sigma}$ is the population standard deviation, where μ is the population mean,

, is the sample mean,

bns exis elqmes ent si \boldsymbol{n}

 \boldsymbol{z} is the cut-off value on the standard normal distribution corresponding

to the confidence level.

included in the body of the particular question. Note: Any additional formulas identified by the examination panel as necessary will be

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Number and algebra

Index laws: For a, b > 0 and m, n real,

$$a^m b^m = (a b)^m$$

$$a^m a^n = a^{m+1}$$

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

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

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

For
$$a > 0$$
 and m an integer and n a positive integer, $a^{\frac{m}{n}} = \sqrt[n]{a^m} = {\binom{n}{\sqrt{a}}}^m$

If f(x) = y then $f'(x) = \frac{dy}{dx}$ Differentiation:

If
$$f(x) = x^n$$
 then $f'(x) = nx^{n-1}$

If
$$f(x) = e^x$$
 then $f'(x) = e^x$

Product rule: If y = f(x) g(x)

If
$$y = uv$$

then
$$y' = f'(x) g(x) + f(x) g'(x)$$

then
$$\frac{dy}{dx} = \frac{du}{dx}v + u\frac{dy}{dx}$$

Quotient rule:

If
$$y = \frac{u}{v}$$

If
$$y = \frac{f(x)}{g(x)}$$

then $y' = \frac{f'(x) g(x) - f(x) g'(x)}{(g(x))^2}$

then
$$\frac{dy}{dx} = \frac{\frac{du}{dx}v - u\frac{dv}{dx}}{v^2}$$

If y = f(g(x))Chain rule:

If
$$y = f(u)$$
 and $u = g(x)$

If
$$y = f(g(x))$$

then $y' = f'(g(x)) g'(x)$

If
$$y = f(u)$$
 and $u = g(x)$
then $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$

Integration:

Powers:

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c, \ n \neq -1$$

Exponentials:

$$\int e^x dx = e^x + c$$

Fundamental Theorem of Calculus:

$$\frac{d}{dx} \left(\int_{a}^{x} f(t) \, dt \right) = f(x)$$

and
$$\int_a^b f'(x) dx = f(b) - f(a)$$

Incremental formula: $\delta y \simeq \frac{dy}{dx} \delta x$

$$\delta y \simeq \frac{dy}{dx} \delta x$$

Exponential growth and decay:

If
$$\frac{dy}{dt} = ky$$
, then $y = Ae^{kt}$

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Space and measurement

Circle: $C = 2\pi r = \pi D$, where C is the circumference,

r is the radius and D is the diameter

 $A = \pi r^2$, where A is the area

 $A = \frac{1}{2}bh$, where b is the base and h is the perpendicular height Triangle:

Parallelogram:

 $A = \frac{1}{2}(a+b)h$, where a and b are the lengths of the parallel sides Trapezium:

Prism: V = Ah, where V is the volume and A is the area of the base

 $V = \frac{1}{2} Ah$ Pyramid:

 $S = 2\pi rh + 2\pi r^2$, where S is the total surface area Cylinder:

 $S = \pi r s + \pi r^2$, where s is the slant height Cone:

Sphere: $S = 4\pi r^2$

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

Volume of solids of revolution:

 $V = \int \pi y^2 dx$ rotated about the x-axis

 $V = \int \pi x^2 dy$ rotated about the *y*-axis

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