



## **NATHEMATICS**

**UNITS 3C AND 3D** 

**FORMULA SHEET** 

2012

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Chance and data

Probability:

For any event  $\Lambda$  and its complement  $\Lambda$ , and event B

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

Mean: (q-1)qnV = o :noihiside deviation: qn = u :neaM

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

where  $\mu$  is the population mean,

z is the cut-off value on the standard normal distribution corresponding

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In a binomial distribution:

A confidence interval for the mean of a population is:

is the population standard deviation,

bns exis eldmss ent si n, is the sample mean,

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 2

## Number and algebra

Index laws:

For a, b > 0 and m, n real,

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

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

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

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

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

$$a^0 = 1$$

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

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

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 
$$y = u$$

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

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

Quotient rule:

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

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

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

hen 
$$\frac{dy}{dx} = \frac{\frac{du}{dx}v - u\frac{d}{dx}}{v^2}$$

Chain rule:

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

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

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

then 
$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

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:

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

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

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

Exponential growth and decay: If  $\frac{dy}{dt} = ky$ , then  $y = Ae^{kt}$ 

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## Space and measurement

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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 = bh

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

and h is the perpendicular height

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

and *h* is the perpendicular height

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

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

 $V = \pi r^2 h$ 

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

 $V = \frac{1}{2}\pi r^2 h$ 

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

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

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