

YEAR 12 *Trial Exam Paper*

2016

MATHEMATICAL METHODS

Written examinations 1 and 2

FORMULA SHEET

Instructions

This formula sheet is provided for your reference.

Students are not permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination.

Mensuration

area of a trapezium	$\frac{1}{2}(a+b)h$	volume of a pyramid	$\frac{1}{3}Ah$
curved surface area of a cylinder	$2\pi rh$	volume of a sphere	$\frac{4}{3}\pi r^3$
volume of a cylinder	$\pi r^2 h$	area of a triangle	$\frac{1}{2}bc \sin(A)$
volume of a cone	$\frac{1}{3}\pi r^2 h$		

Calculus

$\frac{d}{dx}\left(x^n\right)=n x^{n-1}$		$\int x^n d x=\frac{1}{n+1} x^{n+1}+c, n \neq-1$	
$\frac{d}{dx}\left((a x+b)^n\right)=a n(a x+b)^{n-1}$		$\int(a x+b)^n d x=\frac{1}{a(n+1)}(a x+b)^{n+1}+c, n \neq-1$	
$\frac{d}{dx}\left(e^{a x}\right)=a e^{a x}$		$\int e^{a x} d x=\frac{1}{a} e^{a x}+c$	
$\frac{d}{dx}\left(\log _e(x)\right)=\frac{1}{x}$		$\int \frac{1}{x} d x=\log _e(x)+c, x>0$	
$\frac{d}{dx}\left(\sin (a x)\right)=a \cos (a x)$		$\int \sin (a x) d x=-\frac{1}{a} \cos (a x)+c$	
$\frac{d}{dx}\left(\cos (a x)\right)=-a \sin (a x)$		$\int \cos (a x) d x=\frac{1}{a} \cos (a x)+c$	
$\frac{d}{dx}\left(\tan (a x)\right)=\frac{a}{\cos ^2(a x)} a \sec ^2(a x)$			
product rule	$\frac{d}{dx}(u v)=u \frac{dv}{dx}+v \frac{du}{dx}$	quotient rule	$\frac{d}{dx}\left(\frac{u}{v}\right)=\frac{v \frac{du}{dx}-u \frac{dv}{dx}}{v^2}$
chain rule	$\frac{dy}{dx}=\frac{dy}{du} \frac{du}{dx}$		

Probability

$\Pr(A) = 1 - \Pr(A')$		$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$	
$\Pr(A B) = \frac{\Pr(A \cap B)}{\Pr(B)}$			
mean	$\mu = E(X)$	variance	$\text{var}(X) = \sigma^2 = E((X - \mu)^2) = E(X^2) - \mu^2$

Probability distribution		Mean	Variance
discrete	$\Pr(X = x) = p(x)$	$\mu = \sum x p(x)$	$\sigma^2 = \sum (x - \mu)^2 p(x)$
continuous	$\Pr(a < X < b) = \int_{-\infty}^{\infty} x f(x) dx$	$\mu = \int_{-\infty}^{\infty} x f(x) dx$	$\sigma^2 = \int_{-\infty}^{\infty} (x - \mu)^2 f(x) dx$

Sample proportions

$\hat{p} = \frac{X}{n}$		mean	$E(\hat{p}) = p$
standard deviation	$\text{sd}(\hat{p}) = \sqrt{\frac{p(1-p)}{n}}$	approximate confidence interval	$\left(\hat{p} - z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right)$

END OF FORMULA SHEET

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