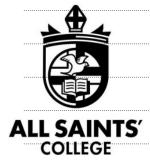


MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 1 - 2017 Differentiation of Exponential and Trigonometric Functions Resource Free

Name:		Teacher:	
Marks:	18		
Time Allo	wed: 20 minutes		
Instructio	ns: You are NOT allowed a	any Calculators or notes.	
	You will be supplied wit	th a formula sheet.	
1. Find	$\frac{dy}{dx} for$ $y = \frac{16e^{x}}{4e^{5x}}$		
b)	$y = 2\sin(e^{2x})$		

c) <i>y</i> =	$=3x^2e^{2x}$ [simplify	y your answer	·]	
d) V =	= 3π tan(1+ <i>e</i>) ²			
				[3,3,3,3 = 12 Mai
	e equation of the ne point (0,4).	e tangent to tl	ne curve defin	ed by h = (e ^{2t})(e ^t -



MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 1 - 2017 Differentiation of Exponential and Trigonometric Functions [6 Marks]

Resource Rich

Name:		Teacher:
Marks:	26	
Time Allowed:	25 minutes	
	re allowed a ClassPad and 1 page of ill be supplied with a formula sheet.	notes (both sides).

1) It is known that the amount of a dangerous 'recreational drug' (in mg) left unabsorbed in the bloodstream after t hours is given by

$$U = 100e^{-0.05t}$$

a) Show that the rate of change of U with respect to time is proportional to the amount of the drug remaining.

b) Find the time taken for 90% of the initial amount of the drug to be absorbed by the bloodstream. Give your answer to the nearest hour.

Find an expression that describes the amount of the drug absorbed by the bloodstream after t hours.

[3,2,1 = 6 Marks]

2) a) The normal to a given curve at a point is defined as the perpendicular to the tangent at that point. Find the equation of the normal to the curve $y = \frac{e^x}{2 - x}$ at the point where x = 1.

b) y = x + 1 is a tangent to the curve $y = ax + b \sin x$ at the point $(\frac{\pi}{2}, 1 + \frac{\pi}{2})$. Find a and b.

3) Fishermen monitored the growth of the population of sardines in a particular location over a 30 year period from 1985 when the population was estimated to be 2 000 000. They found that the population was continuously growing with the instantaneous rate of increase in the population

 $\frac{dP}{dt} \text{ per year } \frac{dP}{dt} \text{ , always close to } \frac{P}{20} \text{ .}$

a) Estimate the population of sardines at the end of the 30 year period.

b) If this pattern of growth continues estimate the population of sardines in 2040.

[3,3=6 marks]

- 4) The displacement, x cm, of a particle from a fixed point O, *t* seconds after it is released is $-5\cos\frac{\pi t}{4}$. Use a calculus method to determine: modelled by the equation x =
 - a) The velocity of the particle after 2 seconds,

b) When during the interval $0 \le t \le 8$, the particle travels with a speed of 1 cms^{-1} .

[2,4=6 marks]

End of Test