MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 1 - 2016
Differentiation of Exponential and Trigonometric Functions
Resource Free

Name: _____ **Teacher:** _____

Marks: **17**

Time Allowed: **15 minutes**

Instructions: You are NOT allowed any Calculators or notes.

You will be supplied with a formula sheet.

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1. Find $\frac{dy}{dx}$ *for*

a) $y = \frac{1}{2e^{3x}}$

b) $y = \cos(e^{x})$

c) $y = 3x^2e^{2x}$

d) $3\tan(1+e)^2$

[3,3,3,2 = 11 Marks]

2. Find the equation of the tangent to the curve defined by $h = (t^2 - 1)(t + 1)^8$:at the point (1,0).

c) $\dfrac{e^{3x}}{(1 - 5x^2)}$

[2,2,2 = 6 marks]

End of Test

Extra space for working out

ii) 100 years

c) What is the rate at which the rainfall is decreasing after 100 years.

[2,2,2,3 = 9 marks]

4) Differentiate each of the following with respect to x:

a) $3x^2\sin(3x)$

b) $[1+\cos(2x)]^4$

ALL SAINTS' COLLEGE

MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 1 - 2016

Differentiation of Exponential and Trigonometric Functions

[6 Marks]

Resource Rich

Name: _____ **Teacher:** _____

Marks: **28**

Time Allowed: **30 minutes**

Instructions: You are allowed a ClassPad and 1 page of notes (both sides).

You will be supplied with a formula sheet.

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1) The population of a colony of numbats is being monitored by a group of scientists from Murdoch University. The population , P, after t years is modelled by the equation

$$P=4000e^{-0.01t}$$

a) What was the initial population of this colony of numbats?

b) Find the exponential growth/decay of this colony?

c) Find the population after 5 years?

d) After how many years will the population of numbats be half the size of the original population?

[1,2,2,2 = 7 Marks]

2) An Olympic Ski Jumping slope has been designed so that it follows the curve:

$$y = 3\cos\left(\frac{\pi x}{4}\right) + 8 \text{ for } 0 \le x \le 5, \text{ where } x \text{ and } y \text{ are both in metres.}$$

a) What is the take-off angle at the end of the jump (to the nearest degree) remembering that m = tan θ?

b) Sketch the curve below:

[4,2 = 6 Marks]

3) Western Australia is suffering from a decrease in average annual rainfall over time, t years, according to the formula $\frac{dR}{dt} = -.00975R$. The first average annual rainfall measured in WA was 880mm.

a) Find a formula for the average annual rainfall in this region.

b) Find the average annual rainfall after:

i) 20 years