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| **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 
   1. *y* = 

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* 1. *y* = cos(*ex*)

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* 1. *y* = 3*x*2*e*2*x*

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* 1. 3tan(1+*e*)2

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

1. Find the equation of the tangent to the curve defined by h = (t2 – 1)(t + 1)8:at the point (1,0).

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| **[6 Marks]** |



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| **MATHEMATICS DEPARTMENT**  **Year 12 Methods - Test Number 1 - 2016  Differentiation of Exponential and Trigonometric Functions  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

* 1. What was the initial population of this colony of numbats?

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* 1. Find the exponential growth/decay of this colony?

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* 1. Find the population after 5 years?

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* 1. After how many years will the population of numbats be half the size of the original population?

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

1. An Olympic Ski Jumping slope has been designed so that it follows the curve:



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

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* 1. Sketch the curve below:

**[4,2 = 6 Marks]**

1. Western Australia is suffering from a decrease in average annual rainfall over time, t years, according to the formula  . The first average annual rainfall measured in WA was 880mm.
   1. Find a formula for the average annual rainfall in this region.

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* 1. Find the average annual rainfall after:
     1. 20 years
     2. 100 years
  2. What is the rate at which the rainfall is decreasing after 100 years.

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

1. Differentiate each of the following with respect to x:
   1. 3x2sin(3x)

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* 1. [1+cos(2x)]4

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* 1. 

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[2,2,2 = 6 marks]

\*\*End of Test\*\*

\*\*\*Extra space for working out\*\*\*

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