**Test 2**

 **Area Under Curve, F.T.O.C. Exponential Functions**

##  Semester One 2018 Year 12 Mathematics Methods

 **Calculator Assumed**

 **Name:**

**Teacher:**

 **Mr McClelland**

 **Mrs. Carter**

 **Mr Gannon**

 **Ms Cheng**

 **Mr Staffe**

 **Mr Strain**

**Date: Friday 16th March 7.45am**

**You may have a formula sheet for this section of the test.**

**Total\_\_\_\_\_\_\_\_\_\_\_/40 45 minutes +5 minutes READING**

**Question 1 (2 marks)**

The graphs with equations *y* = *x*3and *y* = 8 are shown. Write an expression that shows what the area of the shaded region is equal to:



**Question 2 (5 marks)**

(a) Calculate when . (3 marks)

(b) Determine . (2 marks)

**Question 3 (4 marks)**

Show how to calculate the area of the region enclosed by the curves with equations

and and the lines and

Draw a sketch to help show your solution. Show your working.

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**Question 4 (4 marks)**

The graph of shown

Find the value of such that and have the same area.

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**Question 5 (4 marks)**

Given and that when, = 5 and

Find the value of when

**Question 6 (8 marks)**

A group of biologists has decided that colonies of a native Australian animal are in danger if their populations are less than 1000. One such colony had a population of 2300at the start of 2011. The population was growing continuously such that where is the number of animals in the colony years after the start of 2011.

(a) Determine, to the nearest 10 animals, the population of the colony at the start of 2014. (2 marks)

(b) Determine the rate of change of the colony’s population when years. (2 marks)

(c) At the beginning of 2017, a disease caused the colony’s population to decrease continuously at the rate of of the population per year. If this rate continues, when will the colony become “in danger”? Give your answer to the nearest month. (4 marks)

**Question 7 (9 marks)**

(a) What is the sign of from to (1 mark)

(b) What is the sign of from to (1 mark)

(c) Find (2 mark)

(d) Find (2 mark)

(e) What is the area between and the axis from to ?

 (2 marks)

(f) Explain why the answers to (c) and (e) are different. (1 mark)

**Question 8 (4 marks)**

The population of mice in a closed habitat is known to increase according to the function:

+6, where is measured in hundreds of mice per month and is measured in months. The measurement of the population commences at ,

(a) What is the total change in the population in the first 3 months after measuring commenced?

 (2 marks)

(b) How long will it take for the increase in the population of mice to reach 4200? (2 marks)