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|  | Unit 3  Semester 1 2019  Mathematics Methods Test 2  **Integrals, fundamental theorem, applications of integration,**  **Further differentiation and applications and integrals using exponential.**  **Name** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    **Total time allowed: 55 minutes. Total marks: 56 marks**  **Section One: Calculator Assumed**  Time allowed for this section: 26 minutes  Total marks for this section: 26 marks  **Materials allowed for this section:**  SCSA Formula Sheet (provided)  1 Page front and back hand written notes  1 Scientific or Graphics calculator  **Instructions to candidates**  Show all of your working clearly. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat any question, ensure that you cancel the answer you do not wish to have marked. |

# Question 6 (1, 2, 1 = 4 marks)

(a) Find 

(b) Find the Area shaded below



(c) Explain why the answer for (a) is different than (b)

**Question 7 (3 marks)**

The area under the curve  over the domain  is  .

Determine the value of *k*.

**Question 8 (5 marks)**

Determine the area between the curves y = x2 and y = 3x2 + 10x. Show working for full marks.

**Question 9 (3, 4 = 7 marks)**

1. Use Calculus to show that the function , where a is a positive constant, only has one stationary point which is located at (0, -a)

1. Use the second derivative to determine the nature of the stationary point.

**Question 10 (1, 1, 2, 3 = 7 marks )**

The size of a population of birds is changing according to the rule = -0.08*P,* where *P* is the number of birds in the population and *t* is the time in years from the initial population measurement. There are initially 1000 birds in the population.

a) State an equation for *P* in terms of *t*.

b) Determine

i) the number of birds in the population after 10 years.

ii) the time taken (to the nearest month) for the population of birds to drop below 800.

c) What is the value of when t = 10.

Interpret this answer in terms of the bird population

End of Test