**Test 4 2016**

**Calculator Free Section**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_\_\_ / 43**

**Section 1 is worth 75% of your final test mark.**

**No calculators or notes are to be used.**

**Access to approved Sample Mathematics Specialist formulae sheet**

**is permitted. Time limit = 45 minutes.**

**Simplify answers where possible.**

**Question 1 (8 marks)**

Find the following antiderivatives.

|  |  |
| --- | --- |
| **(a)**  (2 marks) | **(b)**  (2 marks) |
| **(c)**  (2 marks) | **(d)**  (2 marks) |

**Question 2 (8 marks)**

Antidifferentiate

**(a)** cos3 5*x*  (4 marks)

**(b)** (2*x* + 4)  using the substitution u = *x* – 2. (4 marks)

**Question 3 (4 marks)**

Given that ,  and , evaluate  in terms of *a*, *b* and/or *c*.

**Question 4 (3 marks)**

Evaluate  exactly.

**Question 5 (1 mark)**

Explain why  is undefined.

**Question 6 (4 marks)**

**Show that = **

**Question 7 (5 marks)**

Showing full algebraic reasoning determine the following definite integral giving your answer as an exact value.



**Question 8 (4 marks)**

Use the substitution *u =* ln*x* to determine **

**Question 9 (6 marks)**

The curve  is rotated one revolution about the y – axis in order to make a cone.

Determine the volume of the cone from y = 0 to y = 3 and show that we can get the same result by using the volume of a cone formula



END OF SECTION

**Test 4 2016**

**Calculator Section**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_\_\_ / 13**

**Section 2 is worth 25% of your final test mark.**

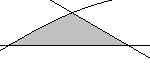
**Calculators allowed and 1 page of A4 notes, writing on both sides.**

**Access to approved Sample Mathematics Specialist formulae sheet**

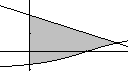
**is permitted. Time limit = 15 minutes.**

**Question 10 (3,2 marks)**

1. Given  and , determine the area enclosed above by

 and  and by the x-axis below.

(not to scale)

1. For the same two functions as part (a), determine the area enclosed on the left by the -axis and on the right by and .

(not to scale)

**Question 11 (4,1 marks)**

The diagram below shows the graph of  and the line .

*x*

*y*

a) Write an integral that can be used to find the area shaded. (4 marks)

b) Determine this area. (1 mark)

**Question 12 (3 marks)**

Calculate the area between the functions  and , giving your answers to 4 decimal places.

END OF PAPER