**** Name: …………..……….......……

|  |  |  |
| --- | --- | --- |
| **Resource Free** | **/25** | **%** |
| **Resource Rich** | **/35** | **%** |
| **Total** | **/60** | **%** |

Mathematics Methods, Year 12, 2018

Test 2 – Further differentiation and applications, Integrals

25 minutes working time.

Calculator Free Section (no notes, no calculators) SCSA Formula sheet allowed

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | (5 marks) |  |  |
|  | Determine each of the following. Express your answers with positive indices. | |  |
|  | (a) |  | (1) |
|  | (b) |  | (2) |
|  | (c) |  | (2) |

|  |  |  |  |
| --- | --- | --- | --- |
| 2. | (4 marks) | Cambridge 445. |  |
|  | The graph of is shown below. | |  |
| (a) | Evaluate | | (2) |
| (b) | Find the exact area of the shaded region in the figure. | | (4) |
| 3 | (4 marks) |  |  |
|  | Find each of the following | |  |
|  | (a) |  | (1) |
|  | (b) |  | (1) |
|  | (c) |  | (2) |
|  |  |  |  |
| 4. | (5 marks) | |  |
|  | Given that , prove that | |  |
| Ot lee pg 40 | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| 5. | (6 marks) |  |  |
|  | Find the derivative of each of the following | |  |
|  | (a) | Pg 46 ot lee | (1) |
|  | (b) | Page 46 ot lee | (2) |
|  | (c) | Page 48 ot lee | (3) |
|  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name: …………..……….......……   |  |  |  | | --- | --- | --- | | **Resource Rich** | **/35** | **%** |   Mathematics Methods, Year 12, 2017  Test 2 – Further differentiation and applications, Integrals  35 minutes working time.Calculator Assumed Section (notes allowed), SCSA Formula sheet and calculators allowed | | | | |  |
|  |
| 1 | (9marks) |  | | |  |
|  | The number of white rhinos in Africa has been decreasing at a rate proportional to the number present since 1993. At the beginning of 1993 there were 440 white rhinos in Africa.  That is where *k* is the constant of proportionality and t is the number of years since 1993. | | | |  |
|  | (a) | Show clearly that satisfies the above equation | | | (2) |
|  | By the beginning of 2000 there were only 356 white rhinos in Africa. | | | |  |
|  | (b) | Determine | | |  |
|  |  | (i) The value of | | | (1) |
|  |  | (ii) The value of the constant of proportionality, correct to three decimal places. | | | (2) |
|  | Hence, or otherwise, | | | |  |
|  | (c) | Determine the expected number of white rhinos at the beginning of 2010. | | | (2) |
|  | (d) | During which year the number of white rhinos will first fall below 300. | | | (2) |
|  |  |  | | |  |
| 2. | (9 marks) | |  | |  |
|  | A particle is moving in rectilinear motion such that velocity, *m/min* at any time, *t* minutes , is given by:  If the particle begins 4 metres to the left of the origin, determine: | | | |  |
|  | (a) | When the particle stops.  *Watp pg 54.* | | | (2) |
|  | (b) | The displacement at any time *t.* | | | (2) |
|  | (c) | The acceleration as the particle passes through the origin. | | | (3) |
|  | (d) | The total distance travelled by the particle in the first two minutes. | | | (2) |
| 3. | (7 Marks) | | | WATP Page 69 |  |
|  | The shaded are is bounded by thex and y axes, the line | | | |  |
|  | (a) | The distance between the supports at the highest point above the stage. | | | (2) |
|  | (b) | The distance between the supports 4 metres from the right hand side of the stage. | | | (2) |
|  | A tight wire is to be connected from the origin to the lower support at a point where | | | |  |
|  | (c) | Determine the equation of this tight wire. | | | (2) |
|  | (d) | State the integral which would be used to determine the area between the supports above the stage (i.e. the shaded region) | | | (2) |
|  | Hence, or otherwise; | | | |  |
|  | (e) | Determine the area between the supports, correct to two decimal places. | | | (2) |
| 4. | (6 marks) |  | | |  |
|  | The rate of change of cost, in dollars of producing *x* tonnes of fertiliser is such that:  Determine: | | | |  |
|  | (a) | The rate at which cost is changing at the instant when 4 tonnes of fertiliser are being produced. | | | (2) |
|  | (b) | The extra cost involved in producing 16 tonnes instead of 9 tonnes of fertiliser. | | | (2) |
|  | (c) | An integral which displays the actual cost of producing the tonne of fertiliser. (Do not evaluate) | | | (2) |
|  |  |  | | |  |
|  |  |  | | |  |
|  |  |  | | |  |