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|  | **Name:**  **Year 12 Methods**  **Task Test 4 – Logarithmic function and calculus of the natural logarithmic function** | Marks  \_\_\_\_\_\_\_  **50** |
| **Due date** | 7% of the year |
| Calc Free questions /29  Calc Assumed questions /21 | | |
| **Materials required:** Standard Writing Equipment Only  SCASA Formula Sheet  ***For Calculator Assumed***: CAS calculator (to be provided by the student) & A4 page of notes | | |

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| **Calculator Free Section 6 Questions 29 Minutes** |

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| **1. (3marks: 1, 2)**  Solve for *x*  (a)  (b) (20)2*x* = 5(22*x* + 1) |

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| **2. (8 marks: 2, 2, 2, 2)**  True or false? Justify your answer.  (a)  (b) for *x* ≠0  (c)  (d)) is defined for *x* > -1 |

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| **3. (5 marks: 2, 1, 2)**    (a) Given the function    (b) Hence determine an expression for    (c)Evaluate |

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| 5. **[7 marks: 2, 2, 3]**  Determine each of the following leaving your answer with positive indices  (a)  (b)  (c)  6. **(6 marks: 3,3)**  Evaluate each of the following definite integrals, leaving your answers as exact answers.  (a)  (b) *dx*  ~End of Test Section 1 |

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| **Calculator Assumed 4 Questions 21 Minute** |

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| 7. (**7 marks: 2, 2, 3**)  Use an algebraic method to solve the following equations, showing all your workings:  (a) 2 x + 1 = 3 x      (b) 2 loga 2 + loga 10 – 3 loga 3 = 3 + loga 5  (c) *ex*+ 2 = 15*e****-****x* |

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| 8. **(4 marks: 1, 1, 2)**  The height of a certain species of shrub *t* years after it is planted is given by:  H = 20 l*n* (3t + 2) + 30 cm, *t*0  (a) How high was the shrub when it was planted?  (b) How long would it take for the shrub to reach a height of 1 m?  (c) At what rate is the shrub’s height changing 3 years after being planted? |

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| 9.  **(5 marks: 3, 2)**  The rate of precipitation for a certain reaction is  where  = 2e-0.05t (grams/second)  (a) Find an expression for the number of grams *N* precipitated in *t* seconds.    (b) Find the number of grams precipitated in the first minute, to the nearest gram. |
| 10. **(5 marks)**  Let f(x)=xln(x+3)  Use calculus to locate and classify all the stationary points of F(x) and find any points of inflection.    ~End of Test Section 2~ |