12 Mathematics Methods 2022

Test 3 – Calculus of trig, exponential and log functions

Section 1: Calculator-free

16 mins | 15 marks

Time allowed: [redacted] **Maximum marks:** [redacted]

Name:_____ **Teacher:** Foster | Kelly

Instructions:

- Show all working clearly.
- Sufficient detail must be shown for marks to be awarded for reasoning.
- A formula sheet will be provided.
- No calculators or personal notes are permitted.

Question 1 **[2, 2 marks]**

Differentiate the following functions with respect to x.

a) $y = \cos[\ln x]$

Question 2 **[3, 4 marks]**

a) Calculate the following.

i) $\int \frac{2-5x^2}{5x^3-6x-9} dx$

ii) $\int \sin(3x)\, dx$

4 marks

Question 3 **[1, 3, 4 = 8 marks]**

Cedric the cyclist travels up and down hills with his velocity (kmh^{-1}) after t hours given by

$v(t) = 20 + 5\sin(3\pi t)$

a) Determine a function for Cedric's acceleration.

b) Determine his maximum acceleration and the first time this occurs for $t > 0$.

c) Calculate Cedric's average speed over first 2 hours

Question 4 [6 marks]

Find the area enclosed, in the first quadrant, between $y = 2e^x$, $x = \frac{1}{2}\log_e y$ and the y-axis.

END OF SECTION 1