VCE Mathematical Methods/Exam One Practice One

Instructions

Reading Time: 15 minutes
Writing Time: 60 minutes

- Students are permitted to use: pencils, pens, highlighters, erasers, sharpeners, rulers, protractors, set-squares, aids for curve sketching
- Students are NOT permitted to use: blank sheets of paper, white-out, any type of technology
- Any diagrams used are NOT drawn to scale unless otherwise indicated
- Students must answer all the questions in the space provided
- In questions where more than one mark is available, appropriate working MUST be shown
- When instructed to **use calculus**, an appropriate derivative or anti-derivative MUST be shown

Questions

Question 1

(a) Given $e^{3x+1} - 1 = 0$, solve for x.

(b) If $f(x) = e^{3x+1} - 1$ and $g(x) = e^x$ state the transformations required to change g into f

[1 + 2 = 3 marks]

Question 2

Let $P(x) = x^4 + 2x^3 - 9x^2 - 2x + 8$ and $Q(x) = x - 1$.

(a) Evaluate $\frac{P(x)}{Q(x)}$

(b) Hence factorise $P(x)$ given that $P(2) = 0$.

(c) Hence sketch the graph of P

[2+2+2 = 6 marks]

Question 3

Let $f : [0, \pi) \to \mathbb{R}, f(x) = -cos(x) - x$. **Use calculus** to find the co-ordinates of the stationary point.

[3 marks]

Question 4

A garden path can be modelled with the equation $y = sin(2x) + 1$ where $x \in [0, 2\pi]$.

(a) Sketch the garden path over the domain specified.

(b) If the x-axis represents a fence, **use calculus** to determine the area between the path and the fence.

[2+2 = 4 marks]

Question 5

State the equations of the tangent **and** the normal of the function $h: (-\infty, -2) \cup (-2, \infty) \to \mathbb{R}, h(x) = log_e(x + 2) + 3$ when $x = 1$

[2 marks]

Question 6

Shirley either eats lamingtons or a muesli bar for morning tea. If Shirley eats lamingtons one day, then the probability she will eat lamingtons the next day is 0.5. If Shirley eats a muesli bar one day, the probability that she will eat a muesli bar the next day is 0.3. If Shirley eats a muesli bar on Tuesday, what is the probability she will eat lamingtons on Thursday?

[2 marks]

Question 7