

LC 2016 (SET A): PAPER 1**QUESTION 4 (25 MARKS)**

$$f(x) = x^3 + x^2 - 2x + 7, x \in \mathbb{R}$$

Question 4 (a)

$$f(x) = y = x^3 + x^2 - 2x + 7$$

$$x = 0: f(0) = 0 + 0 - 0 + 7 = 7$$

(0, 7) is the point it cuts the y-axis.

Question 4 (b)

$$A(1, 7) \in f(x) = x^3 + x^2 - 2x + 7$$

$$x = 1: f(1) = (1)^3 + (1)^2 - 2(1) + 7 \\ = 1 + 1 - 2 + 7 = 7$$

$\therefore A(1, 7) \in f(x)$.

Question 4 (c) (i)

$$f(x) = x^3 + x^2 - 2x + 7$$

$$f'(x) = 3x^2 + 2x - 2$$

$$x = 1: f'(1) = 3(1)^2 + 2(1) - 2 \\ = 3(1) + 2(1) - 2 \\ = 3 + 2 - 2 = 3$$

\therefore Slope = 3

Question 4 (c) (ii)

Point $(x_1, y_1) = A(1, 7)$, slope $m = 3$

$$y - y_1 = m(x - x_1)$$

$$y - 7 = 3(x - 1)$$

$$y - 7 = 3x - 3$$

$$3x - y + 4 = 0$$

MARKING SCHEME NOTES**Question 4 (a) [Scale 5B (0, 2, 5)]**

- 2: • $x = 0$, written
• Zero correctly substituted into equation

Question 4 (b) [Scale 5B (0, 2, 5)]

- 2: • Any correct substitution

Question 4 (c) (i) [Scale 10D (0, 2, 4, 6, 10)]

- 2: • Any correct differentiation
4: • Fully correct differentiation
6: • Correct substitution for slope

Question 4 (c) (ii) [Scale 5B (0, 2, 5)]

- 2: • Shows $m = 3$
• Correct equation of a line formula
• Any correct substitution