

LC 2014 (SET C): PAPER 1

QUESTION 5 (25 MARKS)

Question 5 (a) (i)

$$f : x \mapsto x^3 + 3x^2 - 9x + 5$$

Cuts the y-axis or $f(x)$ axis: Put $x = 0$.

$$f(0) = (0)^3 + 3(0)^2 - 9(0) + 5 = 5$$

$\therefore (0, 5)$ are the co-ordinates of the point where f cuts the y -axis.

Question 5 (a) (ii)

$$f : x \mapsto x^3 + 3x^2 - 9x + 5$$

Cuts the x -axis: $y = 0$ or $f(x) = 0$.

$$f(-5) = (-5)^3 + 3(-5)^2 - 9(-5) + 5$$

$$= -125 + 3(25) + 45 + 5$$

$$= -125 + 75 + 45 + 5$$

$$= 0$$

MARKING SCHEME NOTES

Question 5 (a) (i) (ii) [Scale 10C (0, 3, 7, 10)]

- 3: • Some correct substitution in either or both expressions
- 7: • One expression worked out correctly
 • Both expressions worked out but with errors

Question 5 (b)

FIND TURNING POINTS (LOCAL MAXIMUM/MINIMUM)

Put $\frac{dy}{dx} = 0$ and solve for x

$$f : x \mapsto x^3 + 3x^2 - 9x + 5$$

$$f'(x) = 3x^2 + 6x - 9 = 0$$

$$x^2 + 2x - 3 = 0$$

$$(x+3)(x-1) = 0$$

$$\therefore x = 1, -3$$

$$f(1) = (1)^3 + 3(1)^2 - 9(1) + 5$$

$$= 1 + 3 - 9 + 5 = 0$$

$$f(-3) = (-3)^3 + 3(-3)^2 - 9(-3) + 5$$

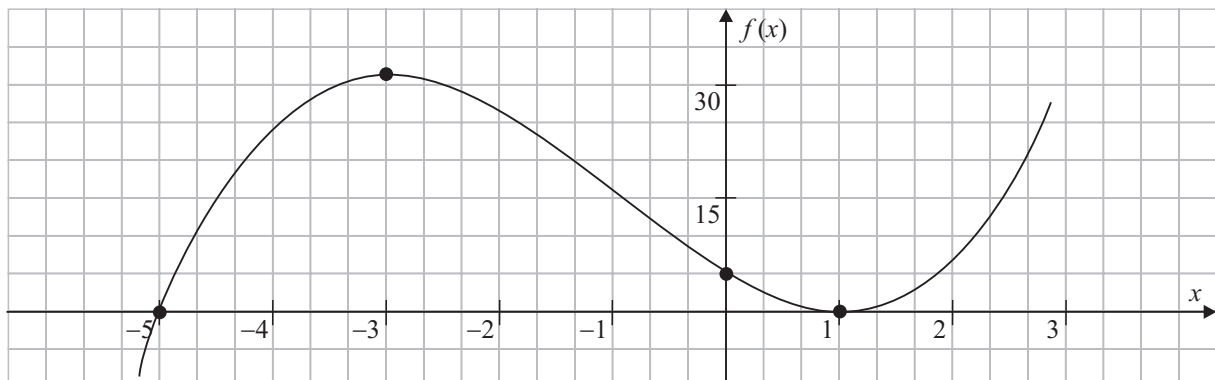
$$= -27 + 27 + 27 + 5 = 32$$

Therefore, $(1, 0)$ and $(-3, 32)$ are the turning points.

$(1, 0)$ is the local minimum and $(-3, 32)$ is the local maximum.

Question 5 (c)

You know 4 points: $(-5, 0)$, $(-3, 32)$, $(0, 5)$ and $(1, 0)$.



MARKING SCHEME NOTES

Question 5 (b) [Scale 10D (0, 3, 5, 8, 10)]

- 3:**
- Differentiates at least one term correctly
 - States $f'(x) = 0$
- 5:**
- Correct differentiation and stops
 - Correct structure to $f'(x) = 0$ but with errors, and continues
 - Correct max and min found graphically
- 8:**
- Finds x values only of turning points
 - Finds co-ordinates but with 2 or more errors

Question 5 (c) [Scale 5C (0, 2, 3, 5)]

- 2:**
- Plots 2 or 3 relevant points correctly
 - Sketches the correct shape with no reference to relevant points
- 3:**
- Plots 4 relevant points correctly, but does not sketch a curve, or sketches an incorrectly shaped curve
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