THE FIRST DERIVATIVE AND TURNING POINTS

1 A function is given by $f(x) = x^2 - 6x + 8$.

(a) Find $f'(x)$. **(b)** Find the coordinates of any stationary points and determine their nature.

(c) Sketch $y = f(x)$.

2 If $f'(x) = x^2 - 5x - 6$ then stationary points may occur when:

A $x = 1, -6$ **B** $x = -2, -3$ **C** $x = -1, 6$ **D** $x = -3, 2$

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5 A function is given by $f(x) = 2x^3 - 15x^2 + 36x$.

(a) Find $f'(x)$. **(b)** Find the coordinates of any stationary points and determine their nature.

(c) Sketch $y = f(x)$.

7 Find the maximum value of $5x - 2x^2$.

9 Sketch the curve $y = x^3 - 6x^2$ over the domain $-1 \leq x \leq 6$, showing the maximum and minimum turning points.

13 Prove that the parabola $y = ax^2 + bx + c$ has a turning point at $x = \frac{-b}{2a}$.

14 Show that the hyperbola $y = \frac{1}{x}$ has no turning points. Also show that its gradient is always negative throughout its domain.