**Question 2** (8 marks)

Consider the function $f(x) = 2x^4 - 8x + 1$. The graph of the function $y = f(x)$ is shown in Figure 1.

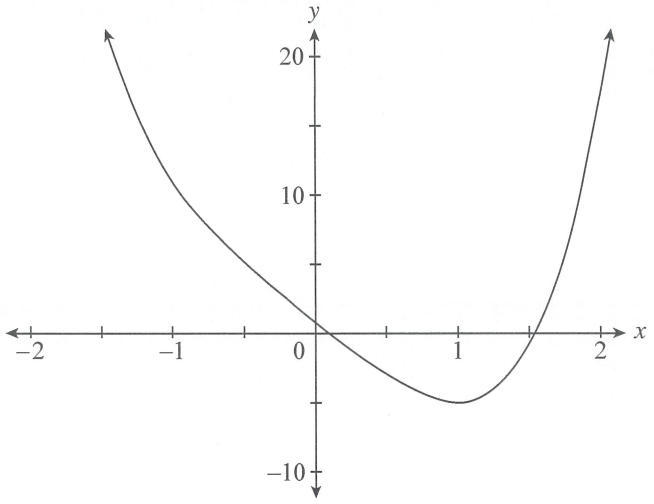



**Figure 1**

(a) (i) Find $f'(x)$.

$f'(x) = 8x^3 - 8$

(1 mark)

(ii) Hence, using an algebraic process, determine the $x$-coordinate and the $y$-coordinate of the stationary point of the graph of $y = f(x)$.

$f'(x) = 0 \Rightarrow 8x^3 - 8 = 0$

$8(x^3 - 1) = 0$

$x^3 = 1$

$x = 1$

$f(1) = 2 - 8 + 1 = -5$

The stationary point of $y = f(x)$ has coordinates $(1, -5)$

(3 marks)

(b) (i) Find $f''(x)$.

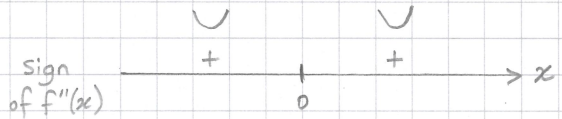
$f''(x) = 24x^2$

(1 mark)

(ii) Determine whether the graph of $y = f(x)$ has any points of inflection. Justify your answer using mathematical reasoning.

$f''(x) = 0 \Rightarrow 24x^2 = 0$

$x = 0$




Note that $f''(x) = 0$ when $x = 0$, but does not change sign either side of $x = 0$.

$\therefore$ The graph of $y = f(x)$ has no points of inflection

(3 marks)