Stationary Points – Questions

Q1) State whether the given function is increasing or decreasing at the indicated value.

a) $f(x) = x^3 - 2x^2 + 6x + 3$ when $x = 1$

b) $f(x) = 2x^3 + x^2 - 8x - 1$ when $x = -1$

Q2) Find the range of values of x for which the function is increasing or decreasing.

a) $f(x) = \frac{1}{3}x^3 - x^2 - 3x + 2$ increasing

b) $f(x) = \frac{1}{3}x^3 + 2x^2 + 3x + 1.$ decreasing

Q3) Find the stationary points of each of the following curves and determine their nature.

a) $y = \frac{1}{3}x^3 - 2x^2 + 3x - 1$

b) $y = x^3 - 2x^2 - 4x + 1$

c) $y = x^2(2 - x)$

Q4) For each of the following functions, determine the greatest and least values on the indicated closed interval.

a) $f(x) = x^3 - 2x^2 + x - 5$ $-2 \leq x \leq 1$

b) $f(x) = x^3 - 3x^2 - 24x + 10$ $-1 \leq x \leq 6$

Stationary Points – Solutions

Q1) a) Since $f'(1) > 0$, the function is increasing at $x = 1$

b) Since $f'(-1) < 0$, the function is decreasing at $x = -1$

Q2) a) f is increasing for $x < -1$ and $x > 3$

b) f is decreasing for $-3 < x < -1$

Q3) a) Stationary points are at $(1, \frac{1}{3})$ and $(3, -1)$

$(1, \frac{1}{3})$ is a maximum turning point and $(3, -1)$ is a minimum turning point

b) Stationary points are at $(-1.5, -6.13)$ and $(2, -7)$

$(-1.5, -6.13)$ is a maximum turning point and $(2, -7)$ is a minimum turning point.

c) Stationary points are at $(0, 0)$ and $(\frac{4}{3}, -\frac{32}{9})$

$(0, 0)$ is a minimum turning point and $(\frac{4}{3}, -\frac{32}{9})$ is a maximum turning point.

Q4) a) The greatest value is -4.85 and the least value is -23.

b) The maximum value is 38 and the minimum value is -70.