Increasing and Decreasing Functions Ex 17.2 Q1(ix)

We have,

$$f(x) = 2x^3 - 15x^2 + 36x + 1$$

$$\therefore \quad f'(x) = 6x^2 - 30x + 36$$

Critical points

$$\Rightarrow \quad 6\left(x^2 - 5x + 6\right) = 0$$

$$\Rightarrow \quad (x-3)(x-2) = 0$$

$$\Rightarrow \quad x = 3,\ 2$$

Clearly, $f'(x) > 0$ if $x < 2$ and $x > 3$

$f'(x) < 0$ if $2 < x < 3$

Thus, $f(x)$ increases in $(-\infty, 2) \cup (3, \infty)$, decreases in $(2, 3)$.

Increasing and Decreasing Functions Ex 17.2 Q1(x)

We have,

$$f(x) = 2x^3 + 9x^2 + 12x - 1$$

$$\therefore \quad f'(x) = 6x^2 + 18x + 12$$

Critical ponts

$$f'(x) = 0$$

$$\Rightarrow \quad 6\left(x^2 + 3x + 2\right) = 0$$

$$\Rightarrow \quad (x+2)(x+1) = 0$$

$$\Rightarrow \quad x = -2,\ -1$$

Increasing and Decreasing Functions Ex 17.2 Q1(xi)

We have,

$$f(x) = 2x^3 - 9x^2 + 12x - 5$$

$$\therefore \quad f'(x) = 6x^2 - 18x + 12$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow \quad 6\left(x^2 - 3x + 2\right) = 0$$

$$\Rightarrow \quad (x-2)(x-1) = 0$$

$$\Rightarrow \quad x = 2,\ 1$$

Clearly, $f'(x) > 0$ if $x < 1$ and $x > 2$

$$f'(x) < 0 \text{ if } 1 < x < 2$$

Thus, $f(x)$ increases in $(-\infty, 1) \cup (2, \infty)$, decreases in $(1, 2)$.

Increasing and Decreasing Functions Ex 17.2 Q1(xii)

We have,

$$f(x) = 6 + 12x + 3x^2 - 2x^3$$

$$\therefore \quad f'(x) = 12 + 6x - 6x^2$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow \quad 6\left(2 + x - x^2\right) = 0$$

$$\Rightarrow \quad (2-x)(1+x) = 0$$

$$\Rightarrow \quad x = 2,\ -1$$

Clearly, $f'(x) > 0$ if $-1 < x < 2$

$$f'(x) < 0 \text{ if } x < -1 \text{ and } x > 2.$$

Thus, $f(x)$ increases in $(-1, 2)$, decreases in $(-\infty, -1) \cup (2, \infty)$.

********** END **********