



Increasing and Decreasing Functions Ex 17.2 Q1(xiii)

We have,

$$f(x) = 2x^3 - 24x + 107$$

$$\therefore f'(x) = 6x^2 - 24$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow 6(x^2 - 4) = 0$$

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

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

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

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

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

Increasing and Decreasing Functions Ex 17.2 Q1(xiv)

We have

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

$$f'(x) = -6x^2 - 18x - 12$$

Critical points

$$f'(x) = 0$$

$$-6x^2 - 18x - 12 = 0$$

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

$$(x + 2)(x + 1) = 0$$

$$x = -2, -1$$

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

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

Thus, $f(x)$ is increasing in $(-\infty, -2) \cup (-1, \infty)$.

Increasing and Decreasing Functions Ex 17.2 Q1(xv)

We have,

$$f(x) = (x - 1)(x - 2)^2$$

$$\therefore f'(x) = (x - 2)^2 + 2(x - 1)(x - 2)$$

$$f'(x) = (x - 2)(x - 2 + 2x - 2)$$

$$\Rightarrow f'(x) = (x - 2)(3x - 4)$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow (x - 2)(3x - 4) = 0$$

$$\Rightarrow x = 2, \frac{4}{3}$$

Clearly, $f'(x) > 0$ if $x < \frac{4}{3}$ and $x > 2$

$$f'(x) < 0 \text{ if } \frac{4}{3} < x < 2$$

Thus, $f(x)$ increases in $(-\infty, \frac{4}{3}) \cup (2, \infty)$, decreases in $(\frac{4}{3}, 2)$.

Increasing and Decreasing Functions Ex 17.2 Q1(xvi)

We have,

$$f(x) = x^3 - 12x^2 + 36x + 17$$

$$\therefore f'(x) = 3x^2 - 24x + 36$$

Critical points

$$f'(x) = 0$$

$$\Rightarrow 3(x^2 - 8x + 12) = 0$$

$$\Rightarrow (x - 6)(x - 2) = 0$$

$$\Rightarrow x = 6, 2$$

Clearly, $f'(x) > 0$ if $x < 2$ and $x > 6$

$$f'(x) < 0 \text{ if } 2 < x < 6$$

Thus, $f(x)$ increases in $(-\infty, 2) \cup (6, \infty)$, decreases in $(2, 6)$.

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