



Increasing and Decreasing Functions Ex 17.1 Q4

We have,

$$f(x) = ax + b, \quad a < 0$$

Let $x_1, x_2 \in \mathbb{R}$ and $x_1 > x_2$

$$\Rightarrow ax_1 < ax_2 \text{ for some } a < 0$$

$$\Rightarrow ax_1 + b < ax_2 + b \text{ for some } b$$

$$\Rightarrow f(x_1) < f(x_2)$$

Hence, $x_1 > x_2 \Rightarrow f(x_1) < f(x_2)$

$\therefore f(x)$ is decreasing function of \mathbb{R} .

Increasing and Decreasing Functions Ex 17.1 Q5

We have,

$$f(x) = \frac{1}{x}$$

Let $x_1, x_2 \in (0, \infty)$ and $x_1 > x_2$

$$\Rightarrow \frac{1}{x_1} < \frac{1}{x_2}$$

$$\Rightarrow f(x_1) < f(x_2)$$

Thus, $x_1 > x_2 \Rightarrow f(x_1) < f(x_2)$

So, $f(x)$ is decreasing function.

Increasing and Decreasing Functions Ex 17.1 Q6

We have,

$$f(x) = \frac{1}{1+x^2}$$

Case I

When $x \in [0, \infty)$

Let $x_1, x_2 \in (0, \infty]$ and $x_1 > x_2$

$$\Rightarrow x_1^2 > x_2^2$$

$$\Rightarrow 1 + x_1^2 > 1 + x_2^2$$

$$\Rightarrow \frac{1}{1+x_1^2} < \frac{1}{1+x_2^2}$$

$$\Rightarrow f(x_1) < f(x_2)$$

So, $f(x)$ is decreasing on $[0, \infty)$

Case II

When $x \in (-\infty, 0]$

Let $x_1 > x_2$

$$\Rightarrow x_1^2 < x_2^2$$

$$[\because -2 > -3 \Rightarrow 4 < 9]$$

$$\Rightarrow 1 + x_1^2 < 1 + x_2^2$$

$$\Rightarrow \frac{1}{1+x_1^2} > \frac{1}{1+x_2^2}$$

$$\Rightarrow f(x_1) > f(x_2)$$

So, $f(x)$ is increasing on $(-\infty, 0]$

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