Increasing and Decreasing Functions Ex 17.1 Q4

We have,

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

Let $x_1, x_2 \in R$ and $x_1 > x_2$

$\Rightarrow \quad ax_1 < ax_2$ for some $a < 0$

$\Rightarrow \quad ax_1 + b < ax_2 + b$ for some b

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

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

$\therefore \quad f(x)$ is decreasing function of 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 $x_1 > x_2$

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

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

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 $x_1 > x_2$

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

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

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

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

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

Case II

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

Let $x_1 > x_2$

$\Rightarrow \quad x_1^2 < x_2^2 \qquad [\because -2 > -3 \Rightarrow 4 < 9]$

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

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

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

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

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