



Increasing and Decreasing Functions Ex 17.2 Q6

We have,

$$f(x) = \log_a x, \quad 0 < a < 1$$

$$\Rightarrow f'(x) = \frac{1}{x \log a}$$

$$\therefore 0 < a < 1$$

$$\Rightarrow \log a < 0$$

Now,

$$x > 0$$

$$\Rightarrow \frac{1}{x} > 0$$

$$\Rightarrow \frac{1}{x \log a} < 0$$

$$\Rightarrow f'(x) < 0$$

Thus,  $f(x)$  is a decreasing function for  $x > 0$ .

Increasing and Decreasing Functions Ex 17.2 Q7

The given function is  $f(x) = \sin x$ .

$$\therefore f'(x) = \cos x$$

(a) Since for each  $x \in \left(0, \frac{\pi}{2}\right)$ ,  $\cos x > 0$ , we have  $f'(x) > 0$ .

Hence,  $f$  is strictly increasing in  $\left(0, \frac{\pi}{2}\right)$ .

(b) Since for each  $x \in \left(\frac{\pi}{2}, \pi\right)$ ,  $\cos x < 0$ , we have  $f'(x) < 0$ .

Hence,  $f$  is strictly decreasing in  $\left(\frac{\pi}{2}, \pi\right)$ .

(c) From the results obtained in (a) and (b), it is clear that  $f$  is neither increasing nor decreasing in  $(0, \pi)$ .

Increasing and Decreasing Functions Ex 17.2 Q8

We have,

$$f(x) = \log \sin x$$

$$\therefore f'(x) = \frac{1}{\sin x} \cos x = \cot x$$

$$\text{In interval } \left(0, \frac{\pi}{2}\right), f'(x) = \cot x > 0.$$

$$\therefore f \text{ is strictly increasing in } \left(0, \frac{\pi}{2}\right).$$

$$\text{In interval } \left(\frac{\pi}{2}, \pi\right), f'(x) = \cot x < 0.$$

$$\therefore f \text{ is strictly decreasing in } \left(\frac{\pi}{2}, \pi\right).$$

Increasing and Decreasing Functions Ex 17.2 Q9

We have,

$$f(x) = x - \sin x$$

$$\therefore f'(x) = 1 - \cos x$$

Now,

$$x \in R$$

$$\Rightarrow -1 < \cos x < 1$$

$$\Rightarrow -1 > \cos x > 0$$

$$\Rightarrow f'(x) > 0$$

Hence,  $f(x)$  is increasing for all  $x \in R$ .

\*\*\*\*\* END \*\*\*\*\*