Increasing and Decreasing Functions Ex 17.2 Q34

We have,

$$f(x) = x^2 - x\sin x$$

$$\therefore \quad f'(x) = 2x - \sin x - x\cos x$$

Now,

$$x \in \left(0, \frac{\pi}{2}\right)$$

$$\Rightarrow \quad 0 \le \sin x \le 1, \quad 0 \le \cos x \le 1$$

$$\Rightarrow \quad 2x - \sin x - x\cos x > 0$$

$$\Rightarrow \quad f'(x) \ge 0$$

Hence, $f(x)$ is an increasing function on $\left(0, \frac{\pi}{2}\right)$.

Increasing and Decreasing Functions Ex 17.2 Q35

We have,

$$f(x) = x^3 - ax$$

$$\therefore \quad f'(x) = 3x^2 - a$$

Given that $f(x)$ is on increasing function

$$\therefore \quad f'(x) > 0 \qquad \text{for all } x \in R$$

$$\Rightarrow \quad 3x^2 - a > 0 \qquad \text{for all } x \in R$$

$$\Rightarrow \quad a < 3x^2 \qquad \text{for all } x \in R$$

But the last value of $3x^2 = 0$ for $x = 0$

$$\therefore \quad a \le 0$$

Increasing and Decreasing Functions Ex 17.2 Q36

We have,

$$f(x) = \sin x - bx + c$$

$$\therefore \quad f'(x) = \cos x - b$$

Given that $f(x)$ is a decreasing function on R

$$\therefore \quad f'(x) < 0 \quad \text{for all } x \in R$$

$$\Rightarrow \quad \cos x - b < 0 \quad \text{for all } x \in R$$

$$\Rightarrow \quad b > \cos x \quad \text{for all } x \in R$$

But man value of $\cos x$ in 1

$$\therefore \quad b \geq 1$$

Increasing and Decreasing Functions Ex 17.2 Q37

We have,

$$f(x) = x + \cos x - a$$

$$\therefore \quad f'(x) = 1 - \sin x = \frac{2\cos^2 x}{2}$$

Now,

$$x \in R$$

$$\Rightarrow \quad \frac{\cos^2 x}{2} > 0$$

$$\Rightarrow \quad \frac{2\cos^2 x}{2} > 0$$

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

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

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