Trigonometric Functions Ex 5.2 Q 2

We have,

$$\sin^2\theta + \cos^2\theta = 1$$

$$\Rightarrow \quad \cos^2\theta = 1 - \sin^2\theta$$

$$\Rightarrow \quad \cos\theta = \pm\sqrt{1 - \sin^2\theta}$$

In the 2st quadrant $\cos\theta$ is negative and $\tan\theta$ is also negative

$$\therefore \quad \cos\theta = -\sqrt{1 - \sin^2\theta}$$

$$= -\sqrt{1 - \left(\frac{12}{13}\right)^2} \qquad \left[\because \quad \sin\theta = \frac{12}{13}\right]$$

$$= -\sqrt{1 - \frac{144}{169}}$$

$$= -\sqrt{\frac{25}{169}}$$

$$= -\frac{5}{13}$$

$$\text{and,} \quad \tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{12}{13}}{\frac{-5}{13}} = -\frac{13}{5}$$

$$\text{Now,} \quad \sec\theta = \frac{1}{\cos\theta} = \frac{1}{\frac{-5}{13}} = -\frac{13}{5}$$

$$\therefore \quad \sec\theta + \tan\theta = -\frac{13}{5} - \frac{12}{5}$$

$$= \frac{-13 - 12}{5}$$

$$= -\frac{25}{5}$$

$$= -5$$

$$\Rightarrow \quad \sec\theta + \tan\theta = -5$$

Trigonometric Functions Ex 5.2 Q 3

We have,

$$\sin\theta = \frac{3}{5}, \quad \tan\phi = \frac{1}{2} \quad \text{and} \frac{\pi}{2} < \theta < \pi < \frac{3\pi}{2}$$

$\Rightarrow$ θ lies in the second quadrant and ϕ lies in the third quadrant.

Now, $\sin^2\theta + \cos^2\theta = 1$

$\Rightarrow$ $\cos^2\theta = 1 - \sin^2\theta$

$\Rightarrow$ $\cos\theta = \pm\sqrt{1 - \sin^2\theta}$

In the 2st quadrant $\cos\theta$ is negative and $\tan\theta$ is also negative

$\therefore$ $\cos\theta = -\sqrt{1 - \sin^2\theta}$

$$= -\sqrt{1 - \left(\frac{3}{5}\right)^2}$$

$$= -\sqrt{1 - \frac{9}{25}}$$

$$= -\sqrt{\frac{16}{25}}$$

$$= -\frac{4}{5}$$

$\Rightarrow$ $\cos\theta = -\frac{4}{5}$

and, $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{3}{5}}{\frac{-4}{5}} = -\frac{3}{4}$ ----- (i)

Now, $\sec^2\phi - \tan^2\phi = 1$

$\Rightarrow$ $\sec^2\phi = 1 + \tan^2\phi$

$\Rightarrow$ $\sec\phi = \pm\sqrt{1 + \tan^2\phi}$

In the third quadrant $\sec\phi$ is negative

$$\therefore \quad \sec\phi = -\sqrt{1+\left(\frac{1}{2}\right)^2}$$

$$= -\sqrt{1+\frac{1}{4}}$$

$$= -\sqrt{\frac{5}{4}}$$

$$\Rightarrow \quad \sec\phi = -\frac{\sqrt{5}}{2} \text{ ------ (ii)}$$

$$\therefore \quad 8\tan\theta - \sqrt{5}\sec\phi$$

$$= 8\times\left(\frac{-3}{4}\right) - \sqrt{5}\times\left(-\frac{\sqrt{5}}{2}\right) \qquad \text{[by equations (i) and (ii)]}$$

$$= -2\times 3 + \frac{5}{2}$$

$$= -6 + \frac{5}{2}$$

$$= \frac{-12+5}{2}$$

$$= \frac{-7}{2}$$

$$\therefore \quad 8\tan\theta - \sqrt{5}\sec\phi = -\frac{7}{2}$$

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