

8. If  $14\theta = \pi$  then the numerical value of  $\frac{\cos 3\theta}{\sin 4\theta} + \frac{\tan \theta}{\cot 6\theta} + \frac{\cos 5\theta}{\cos 9\theta} = \dots$

- (a) -3 (b) 0 (c) 1 (d) 3

9. If  $\tan 25^\circ = k$ , then  $\frac{\cot 205^\circ + \cot 295^\circ}{1 + \tan 335^\circ} = \dots$

- (a)  $\frac{1}{k} - 1$  (b)  $1 + \frac{1}{k}$  (c)  $1 - k^2$  (d)  $k^2 - k$

$\frac{14\theta}{2} = \frac{\pi}{2}$

$7\theta = \frac{\pi}{2}$

$4\theta + 3\theta = \frac{\pi}{2} \implies 4\theta = \frac{\pi}{2} - 3\theta$

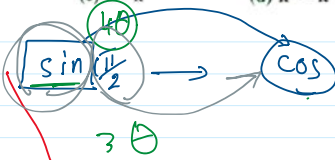
$\sin 4\theta = \sin(\frac{\pi}{2} - 3\theta) = \cos 3\theta$

$\frac{\cos 3\theta}{\sin 4\theta} = \frac{\cos 3\theta}{\cos 3\theta} = 1$

$\cot 6\theta = \cot(\frac{\pi}{2} - \theta) = \tan \theta$

$\frac{\tan \theta}{\cot 6\theta} = \frac{\tan \theta}{\tan \theta} = 1$

$\frac{\cos 5\theta}{\cos 9\theta} = \frac{\cos 5\theta}{-\cos 5\theta} = -1$



$7\theta = \frac{\pi}{2}$   
 $6\theta + \theta = \frac{\pi}{2} - \theta$   
 $6\theta = \frac{\pi}{2} - \theta$

$7\theta = \frac{\pi}{2}$   
 $14\theta = \pi$   
 $9\theta + 5\theta = \pi$   
 $9\theta = \pi - 5\theta$   
 $\cos 9\theta = \cos(\pi - 5\theta) = -\cos 5\theta$

$\cot 205 = \cot(180 + 25) = \cot 25$

$\cot 295 = \cot(270 + 25) = -\tan 25$

$\tan 335 = \tan(360 - 25) = -\tan 25$

$$\frac{\cot 25 + (-\tan 25)}{1 + (-\tan 25)} = \frac{\frac{1}{k} - \frac{k \cdot \pi}{k}}{1 - k}$$

$$= \frac{\frac{1}{k} - \frac{k^2}{k}}{1 - k} = \frac{\frac{1 - k^2}{k}}{1 - k} = \frac{(1+k)(1-k)}{k(1-k)}$$

$$= \frac{1+k}{k} = \frac{1}{k} + \frac{k}{k} = \frac{1}{k} + 1$$