

Assignment : Sum and Difference identity

Find the exact value of each.

1) $\sin 105$

2) $\sin -15$

3) $\sin 15$

4) $\sin 195$

5) $\sin 374\cos 104 - \cos 374\sin 104$

6) $\sin \frac{5\pi}{18}\cos \frac{\pi}{9} - \cos \frac{5\pi}{18}\sin \frac{\pi}{9}$

7) $\sin 241\cos 91 - \cos 241\sin 91$

8)
$$\frac{\tan \frac{14\pi}{9} + \tan \frac{5\pi}{18}}{1 - \tan \frac{14\pi}{9}\tan \frac{5\pi}{18}}$$

Verify each identity.

9) $\tan(\pi + \theta) = \tan \theta$

10) $\tan(\theta - 135) = \frac{\tan \theta + 1}{1 - \tan \theta}$

11) $\cos(\theta + 90) = -\sin \theta$

12) $\tan\left(\frac{\pi}{4} + \theta\right) = \frac{1 + \tan \theta}{1 - \tan \theta}$

13) $\sin\left(\theta - \frac{\pi}{2}\right) = -\cos \theta$

14) $\sin(\theta + \pi) = -\sin \theta$

Answers to Assignment : Sum and Difference identity

$$1) \frac{\sqrt{6} + \sqrt{2}}{4}$$

$$5) -1$$

$$\begin{aligned} 9) \tan(\pi + \theta) &= \frac{\tan \pi + \tan \theta}{1 - \tan \pi \tan \theta} \\ &= \frac{0 + \tan \theta}{1 - 0 \tan \theta} \\ &= \tan \theta \end{aligned}$$

$$\begin{aligned} 12) \tan\left(\frac{\pi}{4} + \theta\right) &= \frac{\tan \frac{\pi}{4} + \tan \theta}{1 - \tan \frac{\pi}{4} \tan \theta} \\ &= \frac{1 + \tan \theta}{1 - \tan \theta} \\ &= \frac{1 + \tan \theta}{1 - \tan \theta} \end{aligned}$$

$$2) \frac{\sqrt{2} - \sqrt{6}}{4}$$

$$6) \frac{1}{2}$$

$$\begin{aligned} 10) \tan(\theta - 135) &= \frac{\tan \theta - \tan 135}{1 + \tan \theta \tan 135} \\ &= \frac{\tan \theta - -1}{1 + \tan \theta \cdot -1} \\ &= \frac{\tan \theta + 1}{1 - \tan \theta} \end{aligned}$$

$$\begin{aligned} 13) \sin\left(\theta - \frac{\pi}{2}\right) &= \sin \theta \cos \frac{\pi}{2} - \cos \theta \sin \frac{\pi}{2} \\ &= \sin \theta \cdot 0 - \cos \theta \cdot 1 \\ &= -\cos \theta \end{aligned}$$

$$3) \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$7) \frac{1}{2}$$

$$\begin{aligned} 11) \cos(\theta + 90) &= \cos \theta \cos 90 - \sin \theta \sin 90 \\ &= \cos \theta \cdot 0 - \sin \theta \cdot 1 \\ &= -\sin \theta \end{aligned}$$

$$\begin{aligned} 14) \sin(\theta + \pi) &= \sin \theta \cos \pi + \cos \theta \sin \pi \\ &= \sin \theta \cdot -1 + \cos \theta \cdot 0 \\ &= -\sin \theta \end{aligned}$$

$$4) \frac{\sqrt{2} - \sqrt{6}}{4}$$

$$8) -\frac{\sqrt{3}}{3}$$

