

Simplifying, Verifying, Solving Equations WS

Simplify.

1) $\cos 4\theta \cos(-6\theta) - \sin 4\theta \sin(-6\theta)$

2) $\sin 6u \cos 5u + \cos 6u \sin 5u$

3) $\frac{\tan 2v + \tan v}{1 - \tan 2v \tan v}$

4) $\frac{\tan 3u - \tan 5u}{1 + \tan 3u \tan 5u}$

5) $\sin 4\theta \cos 6\theta - \cos 4\theta \sin 6\theta$

6) $\cos(-3v) \cos 2v + \sin(-3v) \sin 2v$

Find the exact value of each.

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

8) $\cos \frac{11\pi}{9} \cos \frac{17\pi}{36} + \sin \frac{11\pi}{9} \sin \frac{17\pi}{36}$

9) $\frac{\tan \frac{17\pi}{9} - \tan \frac{5\pi}{9}}{1 + \tan \frac{17\pi}{9} \tan \frac{5\pi}{9}}$

10) $\frac{\tan \frac{\pi}{9} + \tan \frac{5\pi}{36}}{1 - \tan \frac{\pi}{9} \tan \frac{5\pi}{36}}$

11) $\cos \frac{13\pi}{18} \cos \frac{5\pi}{18} - \sin \frac{13\pi}{18} \sin \frac{5\pi}{18}$

12) $\sin \frac{2\pi}{9} \cos \frac{29\pi}{18} + \cos \frac{2\pi}{9} \sin \frac{29\pi}{18}$

Verify each identity.

13) $\cos\left(\frac{3\pi}{2} - x\right) = -\sin x$

14) $\tan(x + \pi) = \tan x$

15) $\sin\left(\frac{3\pi}{2} + x\right) = -\cos x$

16) $\sin\left(x - \frac{\pi}{2}\right) = -\cos x$

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

18) $\cos\left(x - \frac{\pi}{2}\right) = \sin x$

Solve each equation over one revolution of the unit circle.

19) $\sin\left(x + \frac{\pi}{6}\right) - \sin\left(x - \frac{\pi}{6}\right) = \frac{1}{2}$

20) $\sin\left(x + \frac{\pi}{2}\right) - \cos\left(x + \frac{3\pi}{2}\right) = 0$

21) $\tan(x + \pi) + 2\sin(x + \pi) = 0$

22) $2\sin\left(x + \frac{\pi}{2}\right) = \tan \frac{\pi}{3}$

Answers to Simplifying, Verifying, Solving Equations WS

1) $\cos 2\theta$

2) $\sin 11u$

3) $\tan 3v$

4) $-\tan 2u$

5) $-\sin 2\theta$

6) $\cos 5v$

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

8) $-\frac{\sqrt{2}}{2}$

9) $\sqrt{3}$

10) 1

11) -1

12) $-\frac{1}{2}$

13) $\cos\left(\frac{3\pi}{2} - x\right)$

$$= \cos \frac{3\pi}{2} \cos x + \sin \frac{3\pi}{2} \sin x$$

$$= 0 \cos x - \sin x$$

$$= -\sin x$$

15) $\sin\left(\frac{3\pi}{2} + x\right)$

$$= \sin \frac{3\pi}{2} \cos x + \cos \frac{3\pi}{2} \sin x$$

$$= -\cos x + 0 \sin x$$

$$= -\cos x$$

17) $\tan\left(\frac{\pi}{4} - x\right)$

$$= \frac{\tan \frac{\pi}{4} - \tan x}{1 + \tan \frac{\pi}{4} \tan x}$$

$$= \frac{1 - \tan x}{1 + \tan x}$$

$$= \frac{1 - \tan x}{1 + \tan x}$$

$$= \frac{1 - \tan x}{1 + \tan x}$$

20) $\frac{\pi}{4}, \frac{5\pi}{4}$

18) $\cos\left(x - \frac{\pi}{2}\right)$

$$= \cos x \cos \frac{\pi}{2} + \sin x \sin \frac{\pi}{2}$$

$$= \cos x \cdot 0 + \sin x \cdot 1$$

$$= \sin x$$

21) $0, \pi, \frac{\pi}{3}, \frac{5\pi}{3}$

14) $\tan(x + \pi)$

$$= \frac{\tan x + \tan \pi}{1 - \tan x \tan \pi}$$

$$= \frac{\tan x + 0}{1 - \tan x \cdot 0}$$

$$= \tan x$$

16) $\sin\left(x - \frac{\pi}{2}\right)$

$$= \sin x \cos \frac{\pi}{2} - \cos x \sin \frac{\pi}{2}$$

$$= \sin x \cdot 0 - \cos x \cdot 1$$

$$= -\cos x$$

19) $\frac{\pi}{3}, \frac{5\pi}{3}$

22) $\frac{\pi}{6}, \frac{11\pi}{6}$