Trig Identities Name:_____

Use basic identities and algebra to simplify each expression. Assume all denominators are **NOT** zero.

1) $(\sin\theta + \cos\theta)(\sin\theta - \cos\theta)$

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

$1-\cos^2\theta-\cos^2\theta$ or $\sin^2\theta-(1-\sin^2\theta)$

$1-2\cos^2\theta$ or $2\sin^2\theta-1$

2) $(\sin x - \cos x)^2$

$\sin^2 x - 2\sin x\cos x + \cos^2 x$

$1 - 2\sin x\cos x$

or $1-\sin(2x)$

3) $\dfrac{\sin t}{\tan t} = \dfrac{\sin t}{\frac{\sin t}{\cos t}}$

$= \cos t$

4) $(\tan\theta + 2)(\tan\theta - 3) - (6 - \tan\theta) + 2\tan\theta$

$\tan^2\theta - \tan\theta - 6 - 6 + \tan\theta + 2\tan\theta$

$\tan^2\theta + 2\tan\theta - 12$

5) $\left(\dfrac{4\cos^2 x}{\sin^2 x}\right)\left(\dfrac{\sin x}{4\cos x}\right)^2$

$\dfrac{4\cos^2 x}{\sin^2 x} \cdot \dfrac{\sin^2 x}{16\cos^2 x} = \dfrac{1}{4}$

6) $\dfrac{5\cos\theta}{\sin^2\theta} * \dfrac{\sin^2\theta - \sin\theta\cos\theta}{\sin^2\theta - \cos^2\theta}$

$\dfrac{5\cos\theta}{\sin^2\theta} \cdot \dfrac{\sin\theta(\sin\theta-\cos\theta)}{(\sin\theta+\cos\theta)(\sin\theta-\cos\theta)}$

$\dfrac{5\cos\theta}{\sin^2\theta+\sin\theta\cos\theta}$

7) $\dfrac{\cos^2 t + 4\cos t + 4}{\cos t + 2}$

$= \cos t + 2$

8. $\dfrac{\sin^2\theta - 2\sin\theta + 1}{\sin\theta - 1}$

$\sin\theta - 1$

9. $\dfrac{1}{\cos\theta} - \sin\theta\tan\theta$

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

10. $\dfrac{1-\tan^2 x}{1+\tan^2 x} + 2\sin^2 x$

$\dfrac{1-\tan^2 x}{\sec^2 x} + 2\sin^2 x$

$\cos^2 x - \sin^2 x + 2\sin^2 x = 1$

11. $\sqrt{\sin^3\theta\cos\theta} * \sqrt{\cos\theta} = \sin\theta\cos\theta\sqrt{\sin\theta}$

Fundamental Identities Name Key.

Simplify.

1. $\sec\theta(\cot\theta)$

$\frac{1}{\sin\theta} = \csc\theta$

2. $1+\sec^2 x-\tan^2 x$

$1+1=2$

3. $\cos\theta(\sec\theta-\cos\theta)$

$1-\cos^2\theta$

$=\sin^2\theta$

4. $\sin\theta\tan\theta+\cos\theta$

$\frac{\sin^2\theta}{\cos\theta}+\frac{\cos^2\theta}{\cos\theta}=\frac{1}{\cos\theta}$

$=\sec\theta$

5. $(\sin x+\cos x)^2+(\sin x-\cos x)^2$

$\sin^2x+2\sin x\cos x+\cos^2x+\sin^2x-2\sin x\cos x+\cos^2x$

$=2$

6. $\sin\theta\sec\theta\tan\theta$

$\frac{\sin\theta}{\cos\theta}\cdot\frac{\sin\theta}{\cos\theta}=$

$\tan^2\theta=$

$\sec^2\theta-1$

Prove the stated identity

7. $\sec\theta\sin\theta=\tan\theta$

$\frac{1}{\cos\theta}\cdot\sin\theta$

$\frac{\sin\theta}{\cos\theta}=\tan\theta$

8. $\sec^2\theta\cot^2\theta-1=\cot^2\theta$

$\frac{1}{\cos^2\theta}\cdot\frac{\cos^2\theta}{\sin^2\theta}-1$

$\frac{1}{\sin^2\theta}-1$

$\csc^2\theta-1=$

9. $\dfrac{1+\tan^2\theta}{1+\cot^2\theta}=\tan^2\theta$

$\dfrac{1+\frac{\sin^2\theta}{\cos^2\theta}}{1+\frac{\cos^2\theta}{\sin^2\theta}}=\dfrac{\frac{\cos^2\theta+\sin^2\theta}{\cos^2\theta}}{\frac{\sin^2\theta+\cos^2\theta}{\sin^2\theta}}=\dfrac{\sin^2\theta}{\cos^2\theta}$ ✓

10. $\sec\theta-1=\dfrac{\tan^2\theta}{\sec\theta+1}$

$\dfrac{\frac{\sin^2\theta}{\cos^2\theta}}{\frac{1}{\cos\theta}+\frac{\cos\theta}{\cos\theta}}=\dfrac{\frac{\cos\theta}{1+\cos\theta}}{}$

$\left(\cos\theta\right)\dfrac{\sin^2\theta}{1+\cos\theta}=\dfrac{(1-\cos\theta)(1+\cos\theta)}{\cos\theta(1+\cos\theta)}$

$\frac{1}{\cos\theta}-\frac{\cos\theta}{\cos\theta}$ ✓

11. $(\sec^2 x+\tan^2 x)(\sec^2 x-\tan^2 x)-2\tan^2 x(\sec^2 x-\tan^2 x)=1$

$\sec^2x+\tan^2x-2\tan^2x\sec^2x+2\tan^4x=1$

$1+\tan^2x+\tan^2x-2\tan^2x(1+\tan^2x)+2\tan^4x=$

$1=1$ ✓

12. $\dfrac{1+\csc\theta}{1-\csc\theta}+\dfrac{1+\sin\theta}{1-\sin\theta}=0$

$\dfrac{1+\frac{1}{\sin\theta}}{1-\frac{1}{\sin\theta}}+\dfrac{1+\sin\theta}{1-\sin\theta}$

$\dfrac{\sin\theta+1}{\sin\theta-1}+\dfrac{1+\sin\theta}{1-\sin\theta}\left[\frac{-1}{-1}\right]=0$