SATPREP Name_____

Assignment : Multiple Angle Identity

Date_____

Find the exact value of each.

1) $\tan\theta = -\frac{3\sqrt{5}}{5}$ where $\frac{7\pi}{2} \le \theta < 4\pi$

Find $\cos\frac{\theta}{2}$

2) $\tan\theta = -\frac{2}{5}$ where $\frac{\pi}{2} \le \theta < \pi$

Find $\tan\frac{\theta}{2}$

Verify each identity.

3) $2\sin^2 x + \tan^2 x = \sec^2 x - \cos 2x$

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

5) $\frac{\sin 2x}{\sin^2 x} = \frac{2}{\tan x}$

6) $\frac{1}{1 - \tan^2 x} = \frac{\cos^2 x}{\cos 2x}$

7) $\tan^2 x + \tan^2 x\cos 2x - 1 = -\cos 2x$

8) $1 - \tan^2 x = \cos 2x \cdot (\tan^2 x + 1)$

Find the exact value of each.

9) $\sin\theta = -\frac{4}{5}$ where $180 \le \theta < 270$

Find $\tan 2\theta$

10) $\tan\theta = -\frac{4}{3}$ where $90 \le \theta < 180$

Find $\cos 2\theta$

Answers to Assignment : Multiple Angle Identity

1) $\dfrac{\sqrt{98 + 7\sqrt{70}}}{14}$

2) $\dfrac{\sqrt{54 + 10\sqrt{29}}}{2}$

3) $2\sin^2 x + \tan^2 x$ Use $\cos 2x = 1 - 2\sin^2 x$

$\tan^2 x + 1 - \cos 2x$ Use $\tan^2 x + 1 = \sec^2 x$

$\sec^2 x - \cos 2x$ ■

4) $\tan^2 x(1 + \cos 2x)$ Use $\tan^2 x = \dfrac{1 - \cos 2x}{1 + \cos 2x}$

$\dfrac{(1 + \cos 2x)(1 - \cos 2x)}{1 + \cos 2x}$ Cancel common factors

$1 - \cos 2x$ ■

5) $\dfrac{\sin 2x}{\sin^2 x}$ Use $\sin 2x = 2\sin x\cos x$

$\dfrac{2\sin x\cos x}{\sin^2 x}$ Cancel common factors

$\dfrac{2\cos x}{\sin x}$ Use $\tan x = \dfrac{\sin x}{\cos x}$

$\dfrac{2}{\tan x}$ ■

6) $\dfrac{1}{1 - \tan^2 x}$ Decompose into sine and cosine

$\dfrac{1}{1 - \left(\dfrac{\sin x}{\cos x}\right)^2}$ Simplify

$\dfrac{\cos^2 x}{\cos^2 x - \sin^2 x}$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\dfrac{\cos^2 x}{\cos 2x}$ ■

7) $\tan^2 x + \tan^2 x\cos 2x - 1$ Use $\cos 2x = 2\cos^2 x - 1$

$2\tan^2 x\cos^2 x - 1$ Decompose into sine and cosine

$2 \cdot \left(\dfrac{\sin x}{\cos x}\right)^2 \cdot \cos^2 x - 1$ Simplify

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

$-\cos 2x$ ■

8) $1 - \tan^2 x$ Decompose into sine and cosine

$1 - \left(\dfrac{\sin x}{\cos x}\right)^2$ Simplify

$\dfrac{\cos^2 x - \sin^2 x}{\cos^2 x}$ Use $\sec x = \dfrac{1}{\cos x}$

$\sec^2 x(\cos^2 x - \sin^2 x)$ Use $\tan^2 x + 1 = \sec^2 x$

$(\tan^2 x + 1)(\cos^2 x - \sin^2 x)$ Use $\cos 2x = \cos^2 x - \sin^2 x$

$\cos 2x \cdot (\tan^2 x + 1)$ ■

9) $-\dfrac{24}{7}$ 10) $-\dfrac{7}{25}$