Review 5.1-5.3 **Precalculus/Trig** Name Key

Period _____

1) Let $\sin\theta = \frac{3}{8}$ and $\sec\theta < 0$. Find the values of each of the following.

$y = 3$

$r = 8$

$x = -\sqrt{55}$

$64 = x^2 + 9$

$55 = x^2$

A) $\cos\theta = \frac{-\sqrt{55}}{8}$

B) $\csc\theta = 8/3$

2) Simplify by factoring *and* using fundamental identities to simplify this expression to only one trig function: $\sin^2\theta\cos^2\theta - \cos^2\theta$

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

$(\cos^2\theta)(-\cos^2\theta) = -\cos^4\theta$

3) **Factor** each expression. Do not use trig identities.

A) $\tan^2\theta - \cos^2\theta =$

$\left(\frac{\sin^2\theta}{\cos^2\theta}\right) - \cos^2\theta$

$(\tan\theta - \cos\theta)(\tan\theta + \cos\theta)$

B) $3\sin^2\theta - \sin\theta - 2 =$

$(3\sin\theta + 2)(\sin\theta - 1)$

4) Use trigonometric substitution to write the algebraic expression as a trigonometric function of θ, where $0 < \theta < \frac{\pi}{2}$. Use $x = 5\sec\theta$

$\sqrt{4x^2 - 100} =$

$\sqrt{4(5\sec\theta)^2 - 100}$

$\sqrt{4(25\sec^2\theta) - 100}$

$\sqrt{100\sec^2\theta - 100}$

$\sqrt{100(\sec^2\theta - 1)} = \sqrt{100\tan^2\theta} = 10\tan\theta$

5) Verify the identities below algebraically in the vertical format.

A) $\dfrac{\sin\theta}{\csc\theta-1}+\dfrac{\sin\theta}{\csc\theta+1}=2\tan^2\theta$

$$\frac{(\csc\theta+1)\sin\theta + \sin\theta(\csc\theta-1)}{\csc^2\theta-1}$$

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

$$\frac{2}{\cot^2\theta} = 2\left(\frac{1}{\cot^2\theta}\right) = 2\tan^2\theta$$

B) $\sin^4\theta\cos^2\theta-\sin^4\theta=-\sin^6\theta$

$$\sin^4\theta(\cos^2\theta-1) =$$

$$(\sin^4\theta)(-\sin^2\theta) =$$

$$-\sin^6\theta$$

C) $(1+\cot^2\theta)(1-\sin^2\theta)=\cot^2\theta$

$$(\csc^2\theta)(\cos^2\theta) =$$

$$\left(\frac{1}{\sin^2\theta}\right)(\cos^2\theta) =$$

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

$$\cot^2\theta =$$

D) $\dfrac{1-\cos^2\theta}{\cos^2\theta}=\tan^2\theta$

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

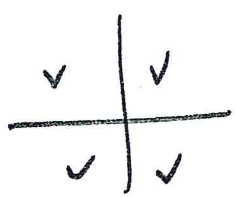
$$\tan^2\theta =$$

Solve each trig equation.

6) $3\tan^2\theta=1$

$$\sqrt{\tan^2\theta} = \sqrt{\frac{1}{3}}$$

$$\tan\theta = \pm\frac{1}{\sqrt{3}}$$



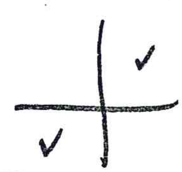
$$\boxed{\begin{aligned}\theta &= \frac{\pi}{6}+n\pi \\ \theta &= \frac{5\pi}{6}+n\pi\end{aligned}}$$

7) $\tan^2\theta=\tan\theta$

$$\tan^2\theta-\tan\theta=0$$

$$\tan\theta(\tan\theta-1)=0$$

$$\tan\theta=0 \qquad \tan\theta=1$$



$$\boxed{\theta=n\pi} \qquad \boxed{\theta=\frac{\pi}{4}+n\pi}$$

Solve each trig equation.

8) $2\sin^2\theta - \sin\theta = 1$

$2\sin^2\theta - \sin\theta - 1 = 0$

$(2\sin\theta + 1)(\sin\theta - 1) = 0$

$2\sin\theta + 1 = 0$

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

$\sin\theta = 1$

$\theta = \frac{\pi}{2} + 2n\pi$

$\theta = \frac{7\pi}{6} + 2n\pi \quad \theta = \frac{11\pi}{6} + 2n\pi$

9) $2\sin\theta + \sqrt{3} = 0$

$\sin\theta = \frac{-\sqrt{3}}{2}$

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

$\theta = \frac{5\pi}{3} + 2n\pi$

10) $3\cos^2\theta - \cos\theta = 4$

$3\cos^2\theta - \cos\theta - 4 = 0$

$(3\cos\theta - 4)(\cos\theta + 1) = 0$

$\cos\theta = \frac{4}{3}$ Not in range

$\cos\theta = -1$

$\boxed{\theta = \pi + 2n\pi}$

Give the values of x in the interval $[0, 2\pi)$.

11) $(\cos\theta + 1)^2 = (\sin\theta)^2$

$\cos^2\theta + 2\cos\theta + 1 = \sin^2\theta$

$\cos^2\theta + 2\cos\theta + 1 = 1 - \cos^2\theta$

$2\cos^2\theta + 2\cos\theta = 0$

$2\cos\theta(\cos\theta + 1) = 0$

$\frac{2\cos\theta}{2} = \frac{0}{2}$

$\cos\theta = 0$

$\theta = \frac{\pi}{2}$ $\cancel{\frac{3\pi}{2}}$

$\cos\theta + 1 = 0$

$\cos\theta = -1$

$\theta = \pi$

12) $\cos\theta = 2$

Not Possible, No Solution b/c 2 in Not in the range $[-1, 1]$