Pre Calculus Name:_____

Trig Equations Review **Find all the solutions of the equation.** Date:_____

#1 - 3

*Calculator use only on 3, 5, 10

1.) $2\cos^2 x + (2-\sqrt{3})\cos x - \sqrt{3} = 0$

$2\cos^2 x + 2\cos x - \sqrt{3}\cos x - \sqrt{3} = 0$

$2\cos x(\cos x + 1) - \sqrt{3}(\cos x + 1) = 0$

$(2\cos x - \sqrt{3})(\cos x + 1) = 0$

$\cos x = \frac{\sqrt{3}}{2}$ $\cos x = -1$ Use $\cos^{-1}$ or arccos

$x = \left\{\frac{\pi}{6}, \frac{11\pi}{6}\right\} + 2\pi n$ $x = \{\pi\} + 2\pi n$

2.) $\cot^2 x - 3 = 0$

$\sqrt{\cot^2 x} = \sqrt{3}$

$\cot x = \pm\sqrt{3}$

$\tan x = \pm\frac{\sqrt{3}}{3}$

$x = \left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\} + \pi n$

3.) $\sec^5 x - 25\sec x = 0$

$\sec x(\sec^4 x - 25) = 0$

$\sec x(\sec^2 x + 5)(\sec^2 x - 5) = 0$

$\sec x = 0$ extraneous

$\sec^2 x = 5$

$\sec x = \pm\sqrt{5} \longrightarrow \cos x = \pm\frac{1}{\sqrt{5}}$

$x = \{63.435, 116.565\} + 180n$

Find all the solutions of the equation in the interval $[0, 2\pi)$. #4-5

4.) $2\sin 2x + 2\cos x = \sqrt{3} + 2\sqrt{3}\sin x$ $\sin(2x) = 2\sin x\cos x$

$4\sin x\cos x + 2\cos x - 2\sqrt{3}\sin x - \sqrt{3} = 0$

$2\cos x(2\sin x + 1) - \sqrt{3}(2\sin x + 1) = 0$

$(2\cos x - \sqrt{3})(2\sin x + 1) = 0$

$\cos x = \frac{\sqrt{3}}{2}$ $\sin x = -\frac{1}{2}$

$x = \{\frac{\pi}{6}, \frac{11\pi}{6}\}$ $x = \{\frac{7\pi}{6}\}$

5.) $6\sec^2 x + 13\sec x - 28 = 0$

$(2\sec x + 7)(3\sec x - 4) = 0$

$\sec x = -\frac{7}{2}$ $\sec x = \frac{4}{3}$

$\cos x = -\frac{2}{7}$ $\cos x = \frac{3}{4}$

$x = \{41.410, 106.602, 253.398, 318.59\}$

PreCalculus Name _____

Solving Trigonometric Equations Review

Date _____ Period ____

Find all solutions to each equation in radians. #6, 7

6) $1 - \frac{1}{5} \cdot \cos\theta = \frac{4}{5}$

$-\frac{1}{5}\cos\theta = -\frac{1}{5}$

$\cos\theta = 1$

$\theta = \{0\} + 2\pi n$

7) $-1 - 3\csc\left(-3\theta + \frac{5\pi}{4}\right) = -3 - 2\csc\left(-3\theta + \frac{5\pi}{4}\right)$

$+1 \quad +1$

$+2\csc\left(-3\theta + \frac{5\pi}{4}\right) = +2\csc\left(-3\theta + \frac{5\pi}{4}\right)$

$+\csc\left(-3\theta + \frac{5\pi}{4}\right) = +2$

$\sin\left(-3\theta + \frac{5\pi}{4}\right) = \frac{1}{2}$

$-3\theta + \frac{5\pi}{4} = \left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\} + 2\pi n$

$\frac{2}{2}\frac{\pi}{6} - \frac{5\pi}{4}\frac{3}{3} \rightarrow \frac{2\pi - 15\pi}{12} \rightarrow \frac{-13\pi}{12}$

$\frac{2}{2}\frac{5\pi}{6} - \frac{5\pi}{4}\cdot\frac{3}{3} \rightarrow \frac{10\pi - 15\pi}{12} \rightarrow \frac{-5\pi}{12}$

$\frac{-3\theta}{-3} = \left\{\frac{\frac{-13\pi}{12}}{-3}, \frac{\frac{-5\pi}{12}}{-3}\right\} + \frac{2\pi n}{-3}$

$\theta = \left\{\frac{13\pi}{36}, \frac{5\pi}{36}\right\} - \frac{2\pi n}{3}$

Solve each equation for $0 \le \theta < 360$. #8

8) $-4 - \frac{7}{3} \cdot \tan(-3\theta + 45) = -\frac{13}{3} - 2\tan(-3\theta + 45)$

$+4 \quad +2\tan(\cdot) \quad +4 \quad +2\tan(\cdot)$

$\left(\frac{6}{3}\right) \qquad \left(\frac{12}{3}\right)$

$-\frac{1}{3}\tan(-3\theta + 45) = -\frac{1}{3}$

$\tan(-3\theta + 45) = 1$

$-3\theta + 45 = 45 + 180n$

$-3\theta = 180n$

$\theta = -60n$

$\theta = \{0, 60, 120, 180, 240, 300\}$

9.) $\left(\sqrt{\frac{1}{2}(1-\cos x)} = \frac{\sqrt{3}}{2}\right)^2$ $x \in [0, 2\pi)$

$\frac{1}{2}(1-\cos x) = \frac{3}{4}$

$1-\cos x = \frac{3}{2}$

$-\cos x = \frac{1}{2} \rightarrow \cos x = -\frac{1}{2} \rightarrow x = \left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$

10.) $6\cos x = -5\sin x$ $x \in [0, 360)$

$\frac{-5\cos x}{} \quad \frac{-5\cos x}{}$

$\frac{6}{-5} = \tan x$

$x = \{129\,806°, 309\,806°\}$

$x = \tan^{-1}\left(\frac{6}{-5}\right)$ (this means x will be in Q2, Q4)

11.) $\frac{1-\sin\theta}{\cos\theta} = 1$ $\theta \in [0, 360)$

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

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

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

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

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

$\sin\theta = 0 \quad \sin\theta = 1$

$\theta = \{0, 90, 180\}$

12.) $3\tan\left(\frac{x}{2} + \pi\right) = \sqrt{27}$ $x \in [0, 2\pi)$

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

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

$\frac{x}{2} + \pi = \frac{\pi}{3} + \pi n$

$-\pi \equiv -\pi$

$\left(\frac{x}{2} = -\frac{2\pi}{3} + \pi n\right) * 2$

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

$x = \left\{\frac{2\pi}{3}\right\}$