Precalculus - Fall 2015
Trig. Practice Test

Name KEY
Period________

You must **SHOW WORK** for full credit. Box your answers. ***No Calculators Allowed.***

Show all work for credit. Box your answer if appropriate. YOU HAVE 80 MINUTES FOR THIS TEST.

1. Establish the identity using either method.
$\tan\theta\cot\theta - \cos^2\theta = \sin^2\theta$

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

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

$\sin^2\theta = \sin^2\theta$ ✓

2. Establish the identity using either method.
$\cos\theta(\tan\theta + \cot\theta) = \csc\theta$

$\cos\theta\tan\theta + \cos\theta\cot\theta = \csc\theta$

$\cos\theta\left(\frac{\sin\theta}{\cos\theta}\right) + \cos\theta\left(\frac{\cos\theta}{\sin\theta}\right) = \csc\theta$

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

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

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

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

$\csc\theta = \csc\theta$ ✓

3. Find the exact value of:

$\sin 140°\cos 10° + \sin 10°\cos 140°$

$\sin(\alpha + \beta) = \sin(140° + 10°)$

$\sin 150° = \frac{1}{2}$

4. Find the exact value of (& *draw pictures*):
$\cos(\alpha - \beta)$

if $\cos\alpha = \frac{-3}{5}; \frac{\pi}{2} < \alpha < \pi$ and

$\sin\beta = \frac{-5}{13}; \frac{3\pi}{2} < \beta < 2\pi$

$\cos\alpha = -\frac{3}{5}$ $x = -3$, $r = 5$, $y = 4$ $\sin\alpha = \frac{4}{5}$

$\sin\beta = -\frac{5}{13}$ $y = -5$, $r = 13$, $x = 12$ $\cos\beta = \frac{12}{13}$

$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$= \left(-\frac{3}{5}\right)\left(\frac{12}{13}\right) + \left(\frac{4}{5}\right)\left(\frac{-5}{13}\right)$

$= \frac{-36}{65} - \frac{20}{65} = \frac{-56}{65}$

5. Use Half Angle Formula to find the exact value of: $\sin\left(\frac{\pi}{8}\right)$ *(reduce/simplify answer!)*	6. Use Sum/Difference Formula to find the exact value of: $\sin 195°$ *(reduce/simplify answer!)*

5.

$\sin\left(\frac{\alpha}{2}\right) = \sqrt{\frac{1-\cos\alpha}{2}}$

$\frac{\alpha}{2} = \frac{\pi}{8} \Rightarrow \alpha = \frac{2\pi}{8} = \frac{\pi}{4}$

$\cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

$0 \leq \alpha \leq \frac{\pi}{2}$

$\sqrt{\frac{1-\frac{\sqrt{2}}{2}}{2}} = \sqrt{\frac{2-\sqrt{2}}{4}}$

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

6.

$\sin 195° = \sin(150° + 45°)$

$= \sin 150° \cos 45° + \cos 150° \sin 45°$

$\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(-\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$

$\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}$

$\frac{\sqrt{2}-\sqrt{6}}{4}$

7. Find the exact value of: $\sec\left(\tan^{-1} -\frac{5}{12}\right)$ *Draw picture!*	8. Graph and give the five critical values within a single period. $y = \sin(2\theta) + 1$

7.

$\theta = \tan^{-1}\left(\frac{-5}{12}\right)$

$\tan\theta = \frac{-5}{12} = \frac{y}{x}$

$y = -5$
$x = 12$
$r = 13$

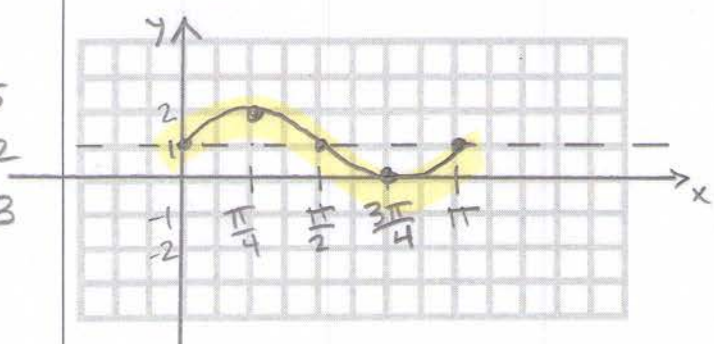
$\sec\theta = \frac{r}{x} = \frac{13}{12}$

$\theta = \sec^{-1}\left(\frac{13}{12}\right)$

$\sec\left(\sec^{-1}\left(\frac{13}{12}\right)\right) = \frac{13}{12}$

8.

$P = \frac{2\pi}{2} = \pi$

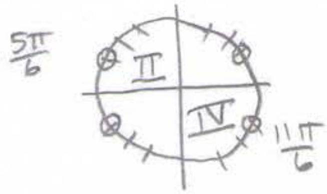


amp: 1 per: π vert: 1 horiz: N/A

Critical values: $(0,1), \left(\frac{\pi}{4}, 2\right), \left(\frac{\pi}{2}, 1\right), \left(\frac{3\pi}{4}, 0\right), (\pi, 1)$

9. Solve the equation on the interval $0 \le \theta < 2\pi$.

$\tan\theta = -\frac{\sqrt{3}}{3}$



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

$\theta = \frac{5\pi}{6} + \pi K$

$\theta = \frac{5\pi}{6}, \frac{11\pi}{6}$

10. Solve the equation on the interval $0 \le \theta < 2\pi$.

$\sin 3\theta = -1$ $\quad \alpha = 3\theta$

$\sin\alpha = -1$

$\alpha = \frac{3\pi}{2} + 2\pi K$

$3\theta = \frac{3\pi}{2} + 2\pi K$

$\theta = \frac{\pi}{2} + \frac{2\pi}{3}K$

$\theta = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$

11. Find the exact value: *draw pictures!*

$\cos\left[\sin^{-1}\left(\frac{1}{2}\right) - \tan^{-1}\left(-\frac{4}{3}\right)\right]$

$\cos[\alpha - \beta]$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\sin^{-1}\left(\frac{1}{2}\right) = \alpha \quad \sin\alpha = \frac{1}{2} \quad \cos\alpha = \frac{\sqrt{3}}{2}$

$\tan^{-1}\left(-\frac{4}{3}\right) = \beta \quad \tan\beta = \frac{-4}{3} \quad y = -4$

$x = 3$

$\cos\beta = \frac{3}{5} \quad \sin\beta = \frac{-4}{5} \quad r = 5$

$\cos(\alpha-\beta) = \left(\frac{\sqrt{3}}{2}\right)\left(\frac{3}{5}\right) + \left(\frac{1}{2}\right)\left(-\frac{4}{5}\right)$

$= \frac{3\sqrt{3}}{10} - \frac{4}{10}$

$\frac{3\sqrt{3}-4}{10}$

12. Solve the inequality. Express your answer in Set Notation. Show test points.

$x^2 + 2x - 10 < 25$

$x^2 + 2x - 35 < 0$

$(x-5)(\ \ +7) < 0$

C.V. $5, -7$

$f(0) = -10 < 25$ True

$\therefore$

$-7 < x < 5$