MATH 253 NAME: SOLUTIONS

QUIZ 7

OCTOBER 28, 2009 SHOW YOUR WORK FOR FULL CREDIT.

1. Find all solutions of the equation $3\sec^2 x - 4 = 0$.

$\sec^2 x = \frac{4}{3}$

$\cos^2 x = \frac{3}{4}$

$\cos x = \pm\frac{\sqrt{3}}{2}$

$x = \frac{\pi}{6} + 2\pi n$

$x = \frac{5\pi}{6} + 2\pi n$

$x = \frac{7\pi}{6} + 2\pi n$

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

OR

$x = \frac{\pi}{6} + \pi n$

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

where $n = 0, \pm 1, \pm 2, \ldots$

2. Find all solutions of the equation $\tan 3x - 1 = 0$ in the interval $[0, 2\pi)$.

$\tan 3x = 1$

$3x = \frac{\pi}{4}, \frac{5\pi}{4}, \frac{9\pi}{4}, \frac{13\pi}{4}, \frac{17\pi}{4}, \frac{21\pi}{4}, \frac{25\pi}{4}$

$x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{9\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{21\pi}{12}, \frac{25\pi}{12}$

3. Find the exact value of $\cos 165°$.

$\cos 165° = \cos(120° + 45°)$

$= \cos 120° \cos 45° - \sin 120° \sin 45°$

$= (-\frac{1}{2})(\frac{\sqrt{2}}{2}) - (\frac{\sqrt{3}}{2})(\frac{\sqrt{2}}{2}) = -\frac{\sqrt{2}}{4}(1 + \sqrt{3})$

4. Find the exact value of the expression $\sin\frac{\pi}{12}\cos\frac{\pi}{4} + \cos\frac{\pi}{12}\sin\frac{\pi}{4}$.

$\sin\left(\frac{\pi}{12} + \frac{\pi}{4}\right) = \sin\frac{\pi}{3}$

$= \frac{\sqrt{3}}{2}$

5. Find the exact value of $\cos(u - v)$ given that $\sin u = -\frac{5}{13}$ and $\cos v = \frac{3}{5}$ where both u and v are in Quadrant IV.

$\cos(u - v) = \cos u \cos v + \sin u \sin v$

$= \frac{12}{13} \cdot \frac{3}{5} + \frac{-5}{13} \cdot \frac{-4}{5}$

$= \frac{36}{65} + \frac{20}{65}$

$= \frac{56}{65}$