Math 1149, Quiz #6, Fall 2013 Name KEY

Instructions: Show all work. Use exact answers unless specifically asked to round.

1. For the following functions, find the domain and range of the graph. Then find the inverse, and state its domain and range.
   a. $f(x) = 2\tan(x) - 3$

D: $x \neq \frac{(2k+1)\pi}{2}$ $(-\pi/2, \pi/2)$ restricted

R: $(-\infty, \infty)$

$y = 2\tan x - 3 \Rightarrow x = 2\tan y - 3 \Rightarrow x+3 = 2\tan y \Rightarrow \frac{x+3}{2} = \tan y$

$y = \tan^{-1}\left(\frac{x+3}{2}\right)$ $f^{-1}(x) = \tan^{-1}\left(\frac{x+3}{2}\right)$

D: $(-\infty, \infty)$ R: $(-\pi/2, \pi/2)$

   b. $g(x) = 4\cos(3x+2)$ $3(x+\frac{2}{3})$

D: $(-\infty, \infty)$ restricted $\left[\frac{0}{3} - \frac{2}{3}, \frac{\pi}{3} - \frac{2}{3}\right] \Rightarrow \left[-\frac{2}{3}, \frac{\pi}{3} - \frac{2}{3}\right]$

R: $[-4, 4]$

$x = 4\cos(3y+2) \Rightarrow \frac{x}{4} = \cos(3y+2) \Rightarrow \cos^{-1}\left(\frac{x}{4}\right) = 3y+2 \Rightarrow$

$\cos^{-1}\left(\frac{x}{4}\right) - 2 = 3y \Rightarrow f^{-1}(x) = \frac{1}{3}\cos^{-1}\left(\frac{x}{4}\right) - \frac{2}{3}$

R: $\left[-\frac{2}{3}, \frac{\pi}{3} - \frac{2}{3}\right]$, D: $[-4, 4]$

2. Simplify each of the following. Give exact answers.
   a. $\tan^{-1}\sqrt{3}$ $\pi/3$

   b. $\sin^{-1}\left(\sin\left(-\frac{3\pi}{7}\right)\right) = -\frac{3\pi}{7}$

   c. $\cos^{-1}\left(\cos\left(\frac{10\pi}{9}\right)\right)$ $\frac{8\pi}{9}$

   d. $\sec\left(\sec^{-1}\left(\frac{1}{2}\right)\right)$ undefined

3. Use your calculator to approximate the value of the following to the nearest 2 decimal places. Be sure your calculator is in radian mode.
   a. $\arccos(-0.4)$ ≈ 1.98

   b. $\text{arccot}(68)$ $= \tan^{-1}(1/68) \approx .01$