Name Solutions

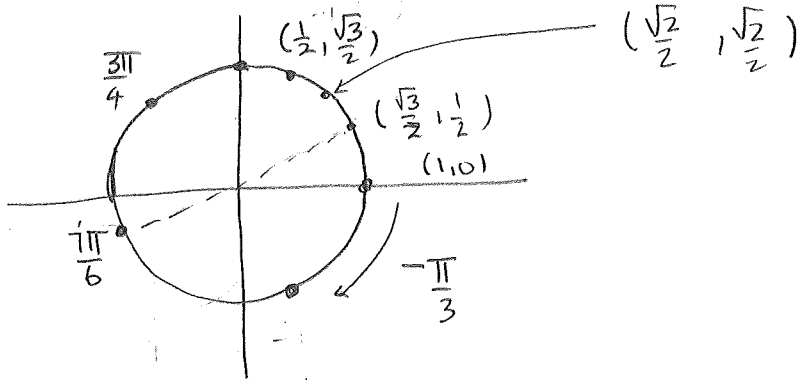
Math 141A	Spring 2014

Quiz One
February 14, 2014

DIRECTIONS:** Allow yourself no more than 30 minutes to complete this quiz. **No calculators.** This quiz is given under conditions of the ***Luther College Honor Code. You are expected to uphold the highest standards of academic integrity, and you are expected to demand the same from fellow students.

1. Fill in the table below with the function values for the corresponding angles. **10 points**

x	0	$\pi/6$	$\pi/3$	$\pi/2$	$3\pi/4$	$7\pi/6$	$-\pi/3$
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
$\tan x$	0	$\frac{1}{\sqrt{3}}$	$\sqrt{3}$	und	-1	$\frac{1}{\sqrt{3}}$	$-\sqrt{3}$



2. Given that $\tan x = 3$ and $x \in [0, \frac{\pi}{2}]$, determine exact values for $\sin x$ and $\cos x$. **10 points**

$\tan x = 3 \Rightarrow \frac{\sin x}{\cos x} = 3 \Rightarrow \sin x = 3\cos x$

$\sin^2 x + \cos^2 x = 1 \Rightarrow (3\cos x)^2 + \cos^2 x = 1$

$\Rightarrow 9\cos^2 x + \cos^2 x = 1$

$\Rightarrow 10\cos^2 x = 1$

$\Rightarrow \cos^2 x = 1/10$

$\Rightarrow \boxed{\cos x = 1/\sqrt{10}}$ (in quad. I)

$\sin x = 3\cos x \Rightarrow \boxed{\sin x = 3/\sqrt{10}}$

3. Suppose $f(x) = 2\cos\left(\frac{1}{2}x + \pi\right) - 1 = 2\cos\left(\frac{1}{2}(x + 2\pi)\right) - 1$ 10 points

(a) Specify the vertical shift, vertical stretch (or shrink), the horizontal shift relative to the graph of $\cos x$, as well as the period of the graph of f.

vertical shift = -1

vertical stretch = 2

horizontal shift = 2π left

new period = $\frac{2\pi}{1/2} = 4\pi$

"new zero"

$\frac{1}{2}x + \pi = 0$

$\frac{1}{2}x = -\pi$

$x = -2\pi$

(b) Sketch a graph of f, on the grid below, over the interval $[-2\pi, 2\pi]$. The horizontal axis is scaled as shown. You may scale the vertical axis as you like.