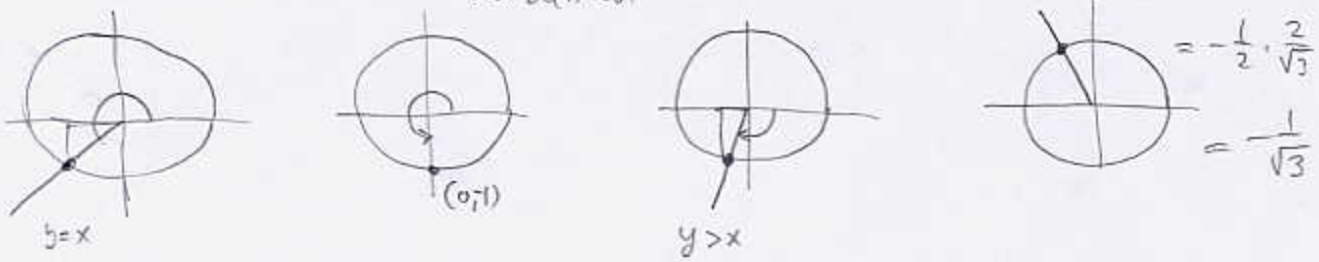
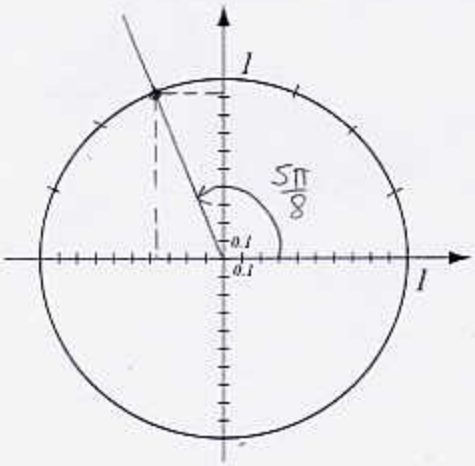
Fall '07/MAT 150/Worksheet 8 **Name:** Solution *Show all your work.*

1. (8pts) Without using the calculator, find the exact values of the following trigonometric expressions. Draw the unit circle and the appropriate angle under the expression.

$\sin 225° = -\frac{\sqrt{2}}{2}$ $\tan\frac{3\pi}{2} = \frac{-1}{0}$ not defined $\cos(-\frac{2\pi}{3}) = -\frac{1}{2}$ $\cot 120° = \frac{x}{y} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{2}\cdot\frac{2}{\sqrt{3}} = -\frac{1}{\sqrt{3}}$



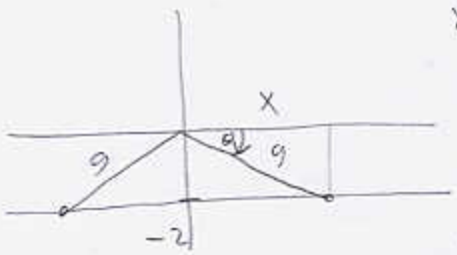
2. (4pts) Use the picture below to estimate $\sin\frac{5\pi}{8}$ and $\cos\frac{5\pi}{8}$. Then evaluate with a calculator and compare the results.



	estimate	calculator
$\sin\frac{5\pi}{8}$	≈ 0.91	0.92
$\cos\frac{5\pi}{8}$	≈ -0.37	-0.38

3. (5pts) If $\sin\theta = -\frac{\sqrt{4}}{9}$ and θ is in the fourth quadrant, find $\cos\theta$, $\cot\theta$, $\sec\theta$. Draw a picture.

$\sin\theta = -\frac{2}{9}$



$x^2 + (-2)^2 = 9^2$

$x^2 + 4 = 81$

$x^2 = 77$

$x = \sqrt{77}$

$\cos\theta = \frac{\sqrt{77}}{9}$

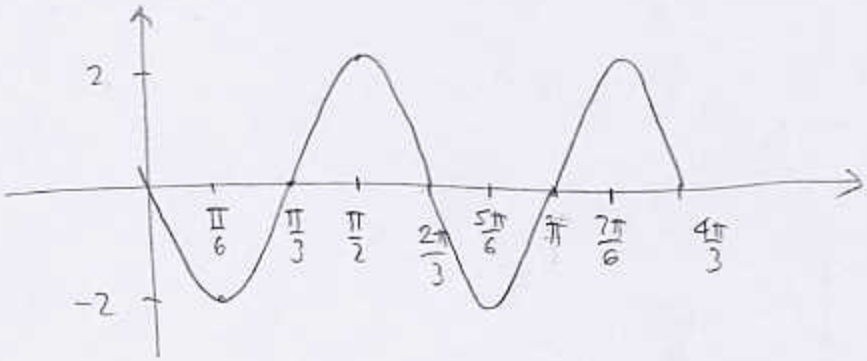
$\cot\theta = -\frac{\sqrt{77}}{2}$

$\sec\theta = \frac{9}{\sqrt{77}}$

4. (5pts) Draw two periods of the graph of $y = -2\sin(3x)$. What is the amplitude? The period? Indicate where the special points are (x-intercepts, peaks, valleys).

amplitude = 2

period = $\frac{2\pi}{3}$



5. (5pts) You are standing on the ground, away from a building, and are holding a taut string that is attached to the top of the building. If the length of the string is 125ft and the angle of elevation of the string is 73°, how tall is the building?

$\frac{h}{125} = \sin 73^\circ$

$h = 125 \sin 73^\circ$

$= 119.5381$ ft

6. (3pts) Use trigonometric identities to simplify without using the calculator:

$\csc^2 53^\circ \cos^2 53^\circ - \sec^2 37^\circ =$ $\frac{\cos^2 53^\circ}{\sin^2 53^\circ} - \sec^2 37^\circ$

[$53^\circ + 37^\circ = 90^\circ$]

$= \frac{\sin^2 37^\circ}{\cos^2 37^\circ} - \sec^2 37^\circ$

$= \tan^2 37^\circ - \sec^2 37^\circ$

[$\tan^2\theta + 1 = \sec^2\theta$

$= -1$