Code B

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Prep-Year Math Program
Math002 Quiz #3

St. ID:_____ St. Name:_____ Sec#:_____ Serial#:_____

Q1

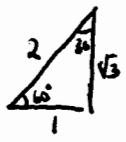
(a) Simplify the expression $\frac{1}{\cos t}-\frac{\cos t}{\sin t+1}$ **(2 points)**

$$\frac{1}{\cos t}-\frac{\cos t}{\sin t+1}=\frac{(\sin t+1)-\cos^2 t}{\cos t(\sin t+1)}=\frac{(\sin t+1)-(1-\sin^2 t)}{\cos t(\sin t+1)}$$

$$=\frac{\sin t+\sin^2 t}{\cos t(\sin t+1)}=\frac{\sin t(1+\sin t)}{\cos t(\sin t+1)}=\tan t \;//$$

(b) Let $W(t)$ be the wrapping function. If $W\left(-\frac{31\pi}{6}\right)=(x,y)$, then find the value of $x-y$

(2 points)



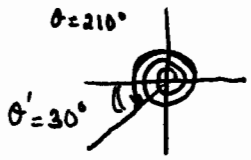
$$W\left(-\frac{31\pi}{6}\right)=W(-930^\circ)=\left[\cos(-930^\circ),\sin(-930^\circ)\right]=(x,y)$$

$$=(\cos 930^\circ,-\sin 930^\circ)$$

$$=(-\cos 30^\circ,\sin 30^\circ)$$

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

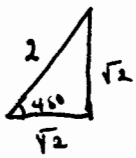
{Coterminal of 930° is 210°
Also ref angle of 210° is 30°.



$$\therefore\ x-y=-\frac{\sqrt{3}}{2}-\frac{1}{2}=\frac{-\sqrt{3}-1}{2}$$

(c) Find the value of $\sec(-330^\circ)+\tan\left(\frac{3\pi}{4}\right)-\sin(-225^\circ)$ **(2 points)**

$$\sec(-330^\circ)+\tan\left(\frac{3\pi}{4}\right)-\sin(-225^\circ)=\sec 330^\circ+\tan 135^\circ+\sin 225^\circ$$



$$=\sec 30^\circ-\tan 45^\circ-\sin 45^\circ$$

$$=\frac{2}{\sqrt{3}}-1-\frac{\sqrt{2}}{2}$$

$$=\frac{4\sqrt{3}-3\sqrt{2}-6}{6}$$

Q2:

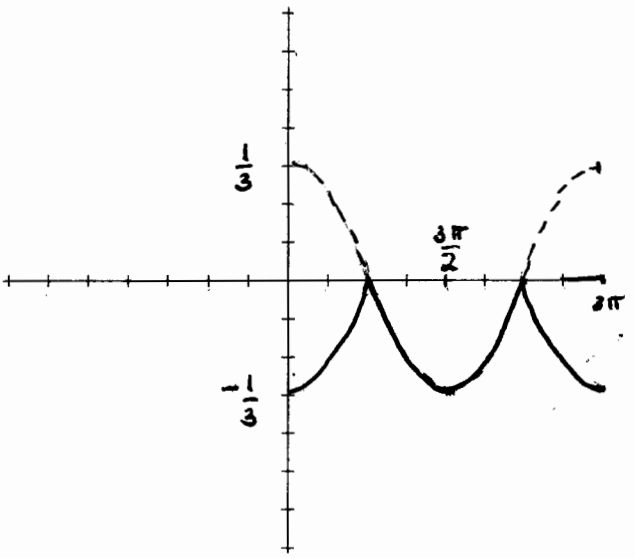
(a) Given that $y = -\left|\frac{1}{3}\cos\frac{2}{3}x\right|$. Find the amplitude, period and the range. **(3 points)**

(i) Amplitude $= |a| = \frac{1}{3}$

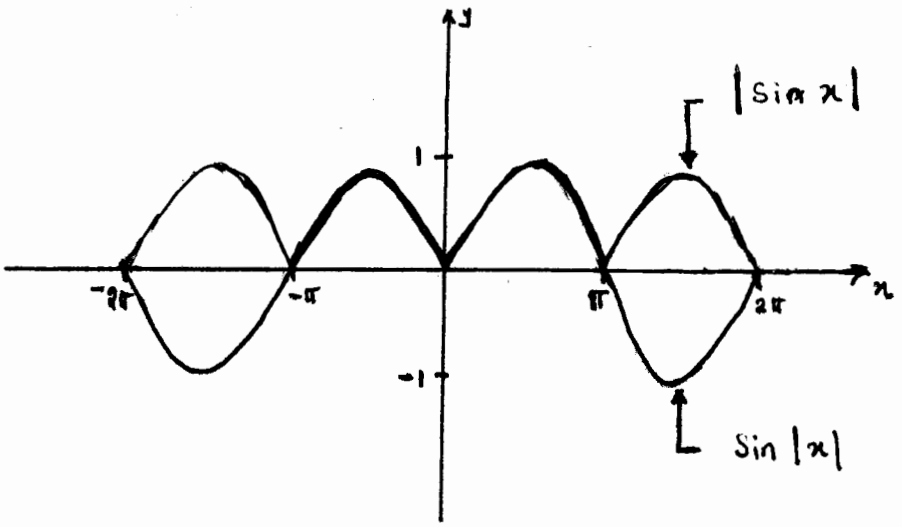
(ii) period $= \frac{\pi}{b} = \frac{\pi}{2/3} = \frac{3\pi}{2}$

(iii) Range $\left[-\frac{1}{3}, 0\right]$

(b) Sketch the graph of (a) above. **(2 points)**



(c) Explain the difference between the graph of $y = \sin|x|$ and $y = |\sin x|$ **(2 points)**



Q3:

(a) Find the equation of the form $y = a\cos bx$ for the adjacent figure **(2.5 points)**

From the graph,

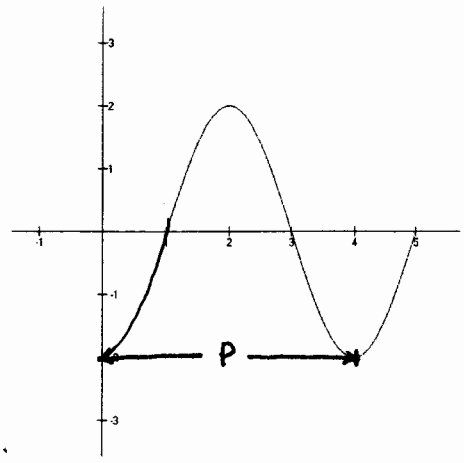
$a = -2$.

period $= \frac{2\pi}{b} = 4$

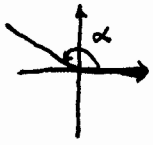
$\Rightarrow b = \pi/2$

Thus,

$y = -2\cos \pi/2\, x$.



(b) If angle α terminates in quadrant II, then write $\sin\alpha$ in terms of $\tan\alpha$ **(2 points)**



$\frac{\sin\alpha}{\cos\alpha} = \tan\alpha \Rightarrow \sin\alpha = \cos\alpha \tan\alpha$

but $\cos\alpha = \frac{1}{\sec\alpha} = \frac{1}{-\sqrt{1+\tan^2\alpha}}$ { in quad II, $\sec\alpha$ is negative.

$\therefore \sin\alpha = \frac{-\tan\alpha}{\sqrt{1+\tan^2\alpha}}$

(c) State whether each of the following expression is TRUE or FALSE **(2.5 points)**

i. $\cot 4 > \tan 6$ T

ii. $y = |\tan 2x|$ has a period of $\frac{\pi}{4}$ F

iii. For $0 < \theta < \frac{\pi}{8}$, $\sec\theta > \csc\theta$ F

iv. For $0 < \theta < \frac{\pi}{8}$, $\cos\theta > \sin\theta$ T

v. $y = x\tan\frac{2}{3}x$ is an odd function F