

Math 113

EXAM II, March 9, 2004, (1 hour).

NAME:

SECTION:

Instructor:

I	II	III	IV	V	VI	Total
30	15	35	30	20	20	150

WHENEVER POSSIBLE, GIVE EXACT VALUES.

TO RECEIVE CREDIT FOR AN ANSWER,
YOU MUST SHOW WORK JUSTIFYING THAT ANSWER.

I. (30 points)
If $\tan \theta = -3$ and $\cos \theta < 0$, evaluate $\sin \theta$ and $\cos \theta$.

II. (Justify your answers - as usual!) (15 points)

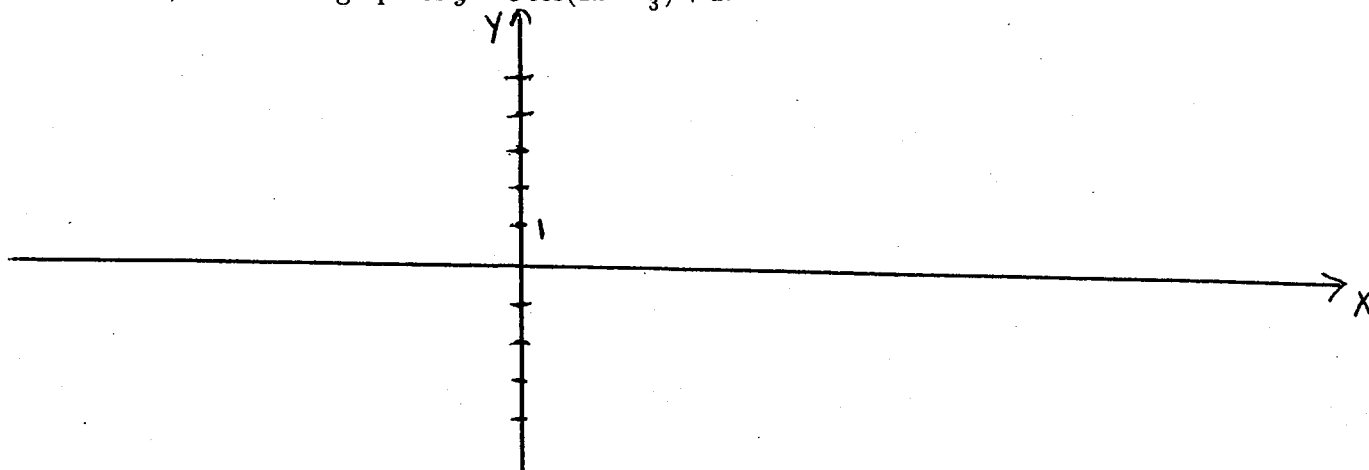
1) If $\cos \theta = \frac{-1}{3}$ and $\sin \theta > 0$, is it necessarily true, possibly true, or impossible that $\theta = \cos^{-1}(\frac{-1}{3})$?

2) If $\cos \theta = \frac{1}{3}$ and $\sin \theta < 0$, is it necessarily true, possibly true, or impossible that $\theta = \cos^{-1}(\frac{1}{3})$?

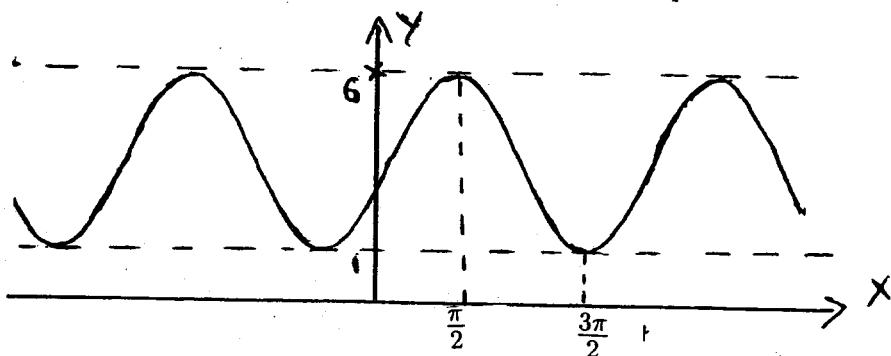
III.

(35 points)

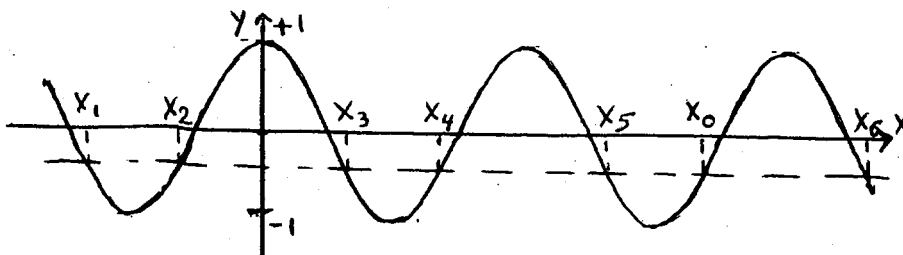
1) Sketch the graph of $y = 3 \cos(2x - \frac{\pi}{3}) + 2$.



2) Find A, B, C, D , with A and $B > 0$, such that the graph shown below is the graph of $y = A \sin(Bx + C) + D$. Is there a unique answer?



3) The graph below is the graph of $y = \cos x$. What are, in terms of x_0 , the values of x_1, x_2, x_3, x_4, x_5 and x_6 ? For which j do we have $x_j = \cos^{-1}(\cos x_0)$?



IV. Given

$$\cos \alpha = \frac{1}{4}, \quad \text{and} \quad \pi \leq \alpha \leq 2\pi$$

give the exact values of $\cos(\alpha + \frac{\pi}{3})$, $\sin(\alpha + \frac{\pi}{6})$, and $\tan(\frac{\pi}{2} - \alpha)$.

(30 points)

ANSWERS:	$\cos(\alpha + \frac{\pi}{3}) =$
$\sin(\alpha + \frac{\pi}{6}) =$	$\tan(\frac{\pi}{2} - \alpha) =$

V. Verify the identity:

(20 points)

$$\tan \theta + \frac{1}{\tan \theta} = \frac{2}{\sin 2\theta}$$

VI. On the figure, O is the center of the disc, R is the radius of the circle and $h = |BD|$. Note that the angle $\angle ABC$ is a right angle. (20 points)

JUSTIFY:

$$|AD| = \frac{h}{\tan \theta}$$

$$|DC| = h \tan \theta$$

$$R = \frac{h}{\sin 2\theta}$$

Write: $|AC| = |AD| + |DC|$. Which trigonometric identity does it yield?

