VERSION II ROSAY

REMINDER: Third midterm on Monday April 18, and Final on Monday May 9 at 7:25.

Math 113 **EXAM II, March 10, 2005,** (1 hour).

NAME: SECTION: Instructor:

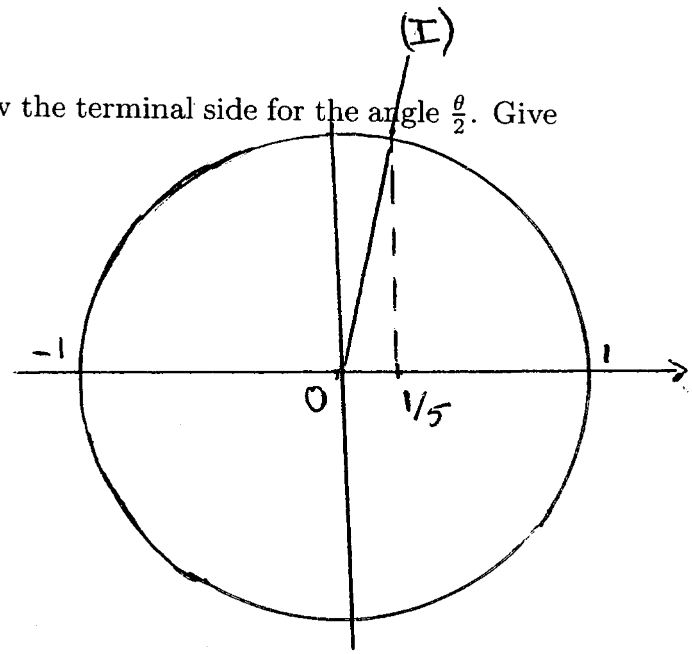
I	II	III	IV	V	VI	Total
30	35	20	30	20	25	160

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

I. (30 points) Let θ be an angle (in standard position) whose terminal side (I) is shown on the figure.

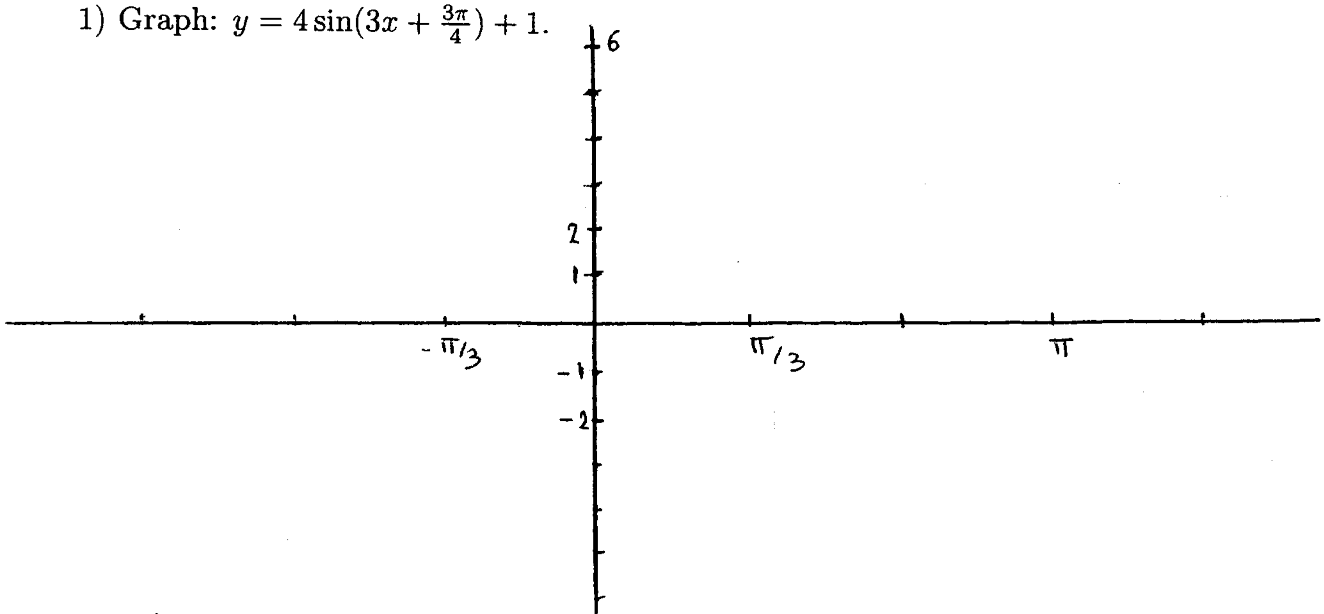
1) Does the figure show that $\cos\theta = \frac{1}{5}$ or does it show that $\sin\theta = \frac{1}{5}$?
Evaluate $\tan\theta$.

2) Assume that (using radians) $2\pi \le \theta \le 4\pi$. Show the terminal side for the angle $\frac{\theta}{2}$. Give the exact values of $\cos\frac{\theta}{2}$ and $\sin\frac{\theta}{2}$.

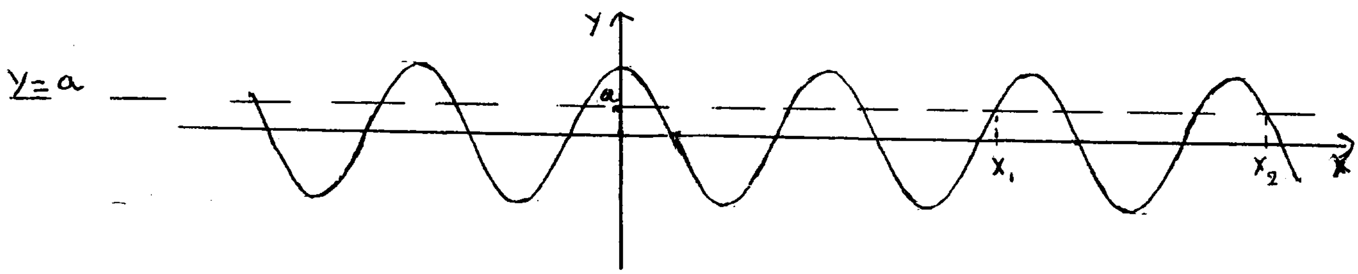


II. (35 points)

1) Graph: $y = 4\sin(3x + \frac{3\pi}{4}) + 1$.



2) The graph shown below is the graph of $\cos x$. It shows that $\cos x_1 = \cos x_2 = a$. Using the graph, show $x_0 = \cos^{-1} a$, and write x_1 and x_2 in terms of x_0.



Assume now that $a = \frac{1}{3}$. Evaluate $\sin x_1$, and $\tan x_1$.

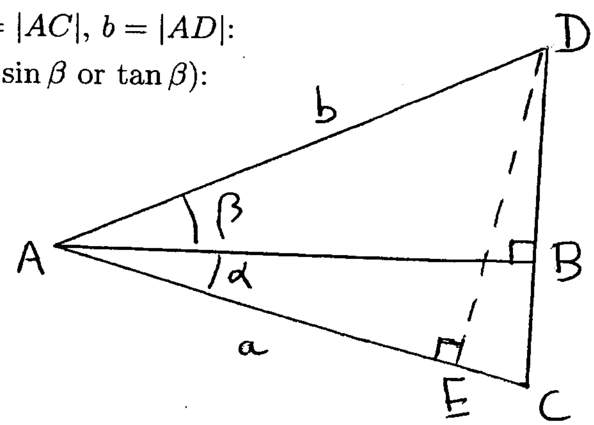
III. (20 points)
Give an example of an angle θ such that $\cos\theta < 0$ but $\cos\frac{\theta}{2} > 0$.

Give an example of an angle θ such that $\cos\theta > 0$ but $\cos\frac{\theta}{2} < 0$.

IV. (30 points) Evaluate EXACTLY (NO CALCULATOR) $\cos 210^o$ and $\cos 105^o$. Method of your choice (e.g. using $105 = \frac{210}{2}$ or $105 = 60 + 45$).

V. (20 points) Prove the identity: $\tan\alpha\cos^2\beta + \sin\beta\cos\beta = \frac{\cos\beta}{\cos\alpha}\sin(\alpha+\beta)$.

VI. (25 points) With the notations on the figure, and $a = |AC|$, $b = |AD|$:



1) Evaluate in terms of b and β (i.e. using either $\cos\beta$ or $\sin\beta$ or $\tan\beta$):

$|DB| =$

$|AB| =$

Area of triangle $ABD =$

2) Evaluate in terms of a and α:

$|AB| =$

$|BC| =$

Area of triangle $ABC =$

3) Evaluate $|DE|$ in terms of b and $\alpha+\beta$.

$|DE| =$

Then evaluate the area of the triangle ADC in terms of a, b and $\alpha+\beta$.

Area of triangle $ADC =$

4) Justify: $a = b\,\frac{\cos\beta}{\cos\alpha}$.

5) Write that the area of the triangle ADC is the sum of the areas of the triangles ABD and ABC and use 4). What do you get?