

Rosay

Math 113

EXAM I, Oct. 4, 2000, (1 hour).

NAME:

SECTION:

instructor's name:

I	II	III	IV	V	VI	VII	Total
15	5	15	15	15	15	20	100

To receive credit for an answer, you MUST show work justifying that answer.

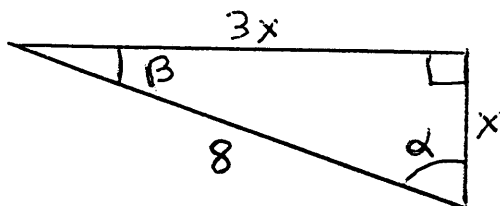
WHENEVER POSSIBLE, GIVE EXACT VALUES.

FULL CREDIT WILL BE GIVEN ONLY FOR CLEAR AND ACCURATE FIGURES.

I.

(15 points)

In the figure below, one of the legs of the triangle has length x (units) while the other one has length $3x$. Find the exact value of x , and give the exact values of the cosines, sines and tangents of the angles α and β .



$x =$

$\cos(\alpha) =$, $\sin(\alpha) =$, $\tan(\alpha) =$

$\cos(\beta) =$, $\sin(\beta) =$, $\tan(\beta) =$

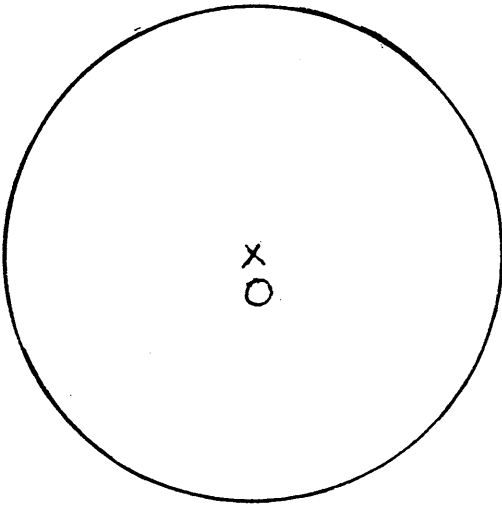
Using your calculator, evaluate the angles α and β .

II. Convert to decimal degrees.

(5 points)

$$37^{\circ}06' =$$

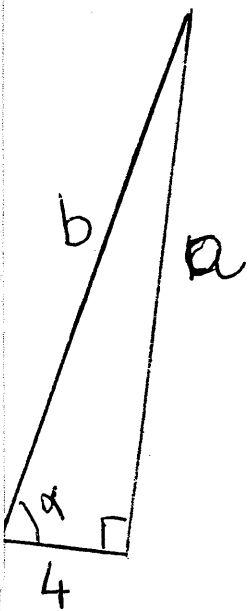
III. What are the exact radian measure and degree measure of an angle θ at the center of a circle of radius 5, corresponding to an arc of length 15. Draw a figure giving a reasonably good idea of how big the angle is. Give the exact value of the area of the corresponding circular sector. (15 points)



IV. Given $\cos \alpha = \frac{1}{5}$, give the EXACT values of a and b .

(15 points)

Answers using the calculator will receive no more than half the credit.

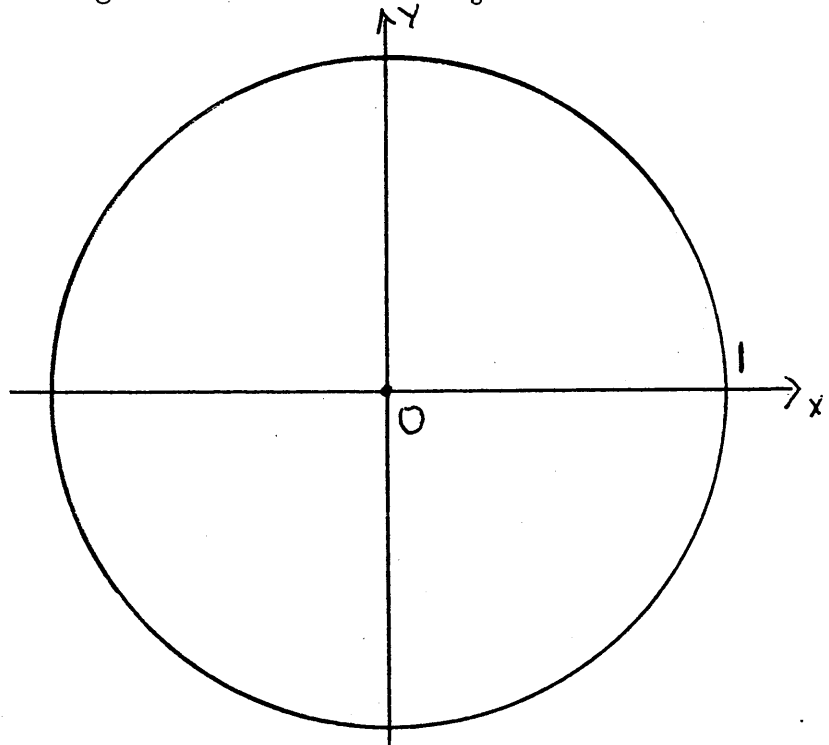


V.

(15 points)

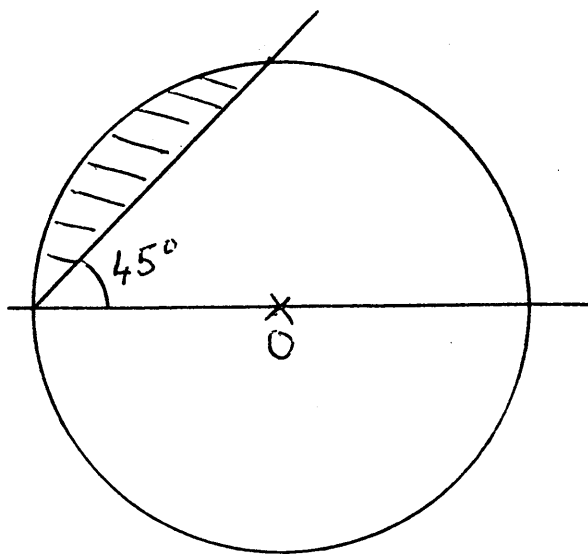
On the figure (with a circle of radius 1), show the terminal side for an angle in standard position with measure $+\frac{7\pi}{8}$.

Then, show how to find $\sin \frac{7\pi}{8}$ on this figure. Show with a dotted line what is the other possible terminal side for an angle θ such that $\sin \theta = \sin \frac{7\pi}{8}$.



What is the EXACT value of $\sin^{-1}(\sin(\frac{7\pi}{8}))$?

VI. Evaluate the area of the shaded region, in terms of the radius R of the circle. (15 points)



VII. From one bank of a river, one sees the top of a tree on an island an angle of elevation of 50° . From the other bank of the river, the top of the same tree is seen at an angle of elevation of 40° . If the river is 40 ft wide, how tall is the tree?

(The banks of the river are assumed to be parallel, and both observations are made from the point on the bank closest to the tree.) (20 points)

Method imposed: Solve this problem with the tools of Chapter 1 (Right Triangle Ratios, definitions of sine, cosine etc..). (No solution using the law of sines or the law of cosines, to be seen in Chapter 6).