

Math 113 First Exam
Version A

May 28, 2004
11:30am - 12:20pm
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NAME:

Keep exact values whenever possible.
Full credit can only be given to justified answers.

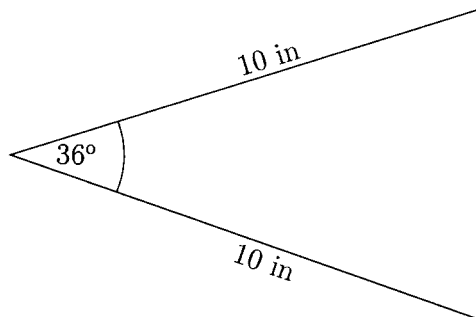
1. A wind turbine has a rotor of radius 100 feet, rotating with an angular velocity of $\frac{2}{3}\pi$ ($\frac{1}{8}$). Compute
- (a) (5 points) how many revolutions it makes in a minute,
 - (b) (10 points) the velocity in MPH of a point at the end of a blade (i.e., 100 feet far from the center of the rotor) (1 mile = 5280 feet),
 - (c) (5 points) the distance in miles this point travels during a day.

2.

(a) (10 points) Find the smallest positive angle in radians which is coterminal with 40° .

(b) (10 points) Find the smallest positive angle in degrees which is coterminal with 40 radians.

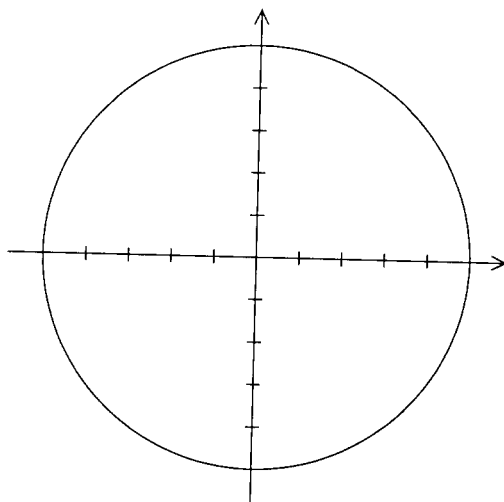
3. (25 points) In pizzeria *A*, a round pizza of diameter 20 inches is cut into 10 equal slices. In pizzeria *B*, slices have this triangular shape:



Compute the difference between the area of a slice in pizzeria *A* and in pizzeria *B*.

4.

- (a) (10 points) Draw with the best possible accuracy an angle α in standard position for which $\cos \Theta = -\frac{4}{5}$ holds.
- (b) (10 points) Draw with the best possible accuracy an angle β in standard position for which $\tan \Theta = \frac{3}{4}$ holds.
- (c) (5 points) Is it possible for an angle α satisfying (a) and an angle β satisfying (b) to coincide? How?



5. (30 points) An airplane flies straight above us at a constant altitude and with a speed of 500 MPH. We want to know how high it flies. By the time we find our stopwatch, the angle of elevation of the plane has already decreased to 45° . With the help of the stopwatch, we then find that it takes 30 seconds until the angle of elevation decreases further from 45° to 30° . Determine the distance it traveled during this 30 seconds, and use right triangles to compute the altitude of this flight.