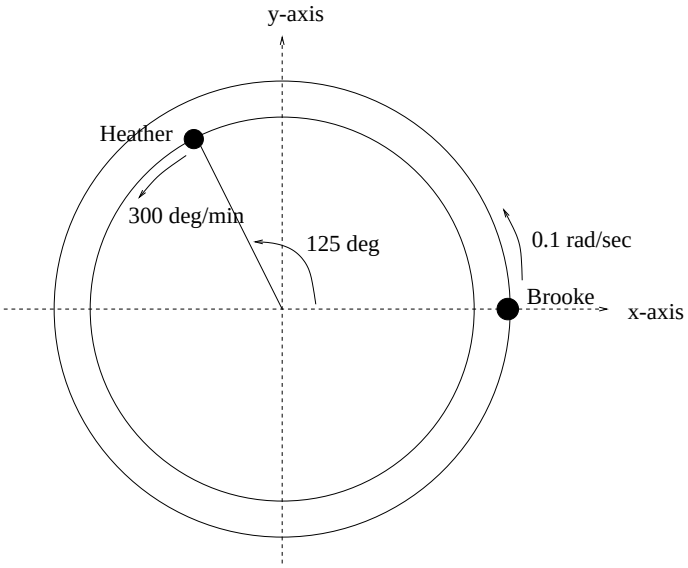
Math 120
2 November 2000
Quiz #5 (20 points)

Name _____
Section _____
TA: _____

Instructions: You have 25 minutes for this quiz. You **MUST** show work for credit. No credit for answers only. If in doubt, ask for clarification. NO GRAPHING CALCULATORS ALLOWED. Use 2 decimal places of accuracy.

1. (11pts; 3,2,2,4) Heather and Brooke start running around a circular track at the same moment; the picture is a top view. Their starting positions are indicated. Heather is in the inside lane which is a circle of radius 100 feet and her angular speed is $\omega = 300$ deg/min; Brooke is in the outside lane which is a circle of radius 130 feet and her angular speed is $\omega = 0.1$ rad/sec.



(a) Calculate Heather's angular speed in units of "rad/sec". Which girl is running faster?

(b) When will Heather first cross the negative x-axis?

(c) Calculate Brooke's linear speed.

(d) When will the two girls pass one another?

2. (9pts; 6,2,1) Sonia is working with a culture of mutant yeast cells. Undisturbed, she notices the culture gives off carbon dioxide at the rate of 0.5 ml/hr. If she adds magnesium, the rate of carbon dioxide production increases. For example, if she adds 4 grams of magnesium, carbon dioxide is produced at the rate of 0.8 ml/hr. Adding more and more magnesium, the rate of carbon dioxide production approaches but never exceeds 2 ml/hr.

   (a) Find a linear to linear rational function $y = f(m)$ that calculates the rate y of carbon dioxide produced if m grams of magnesium are added to the culture.

   (b) How much magnesium needs to be added so that carbon dioxide is produced at the rate of 1.5 ml/hr?

   (c) Assume that Sonia has added enough magnesium so that carbon dioxide is produced at the rate of 1.5 ml/hr (i.e. the amount you determined in part (b)). How much carbon dioxide will be produced in one day following the addition of the magnesium?