

**Math 120B**  
**Final Exam**  
**August 18, 2005**

Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

1. Your exam contains 4 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 60 points. Point values for problems vary and these are clearly indicated. You have 1 hour for this exam.
3. Make sure to ALWAYS SHOW YOUR WORK; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back page of the exam and clearly indicate this.
5. You are allowed one  $8.5 \times 11$  sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.

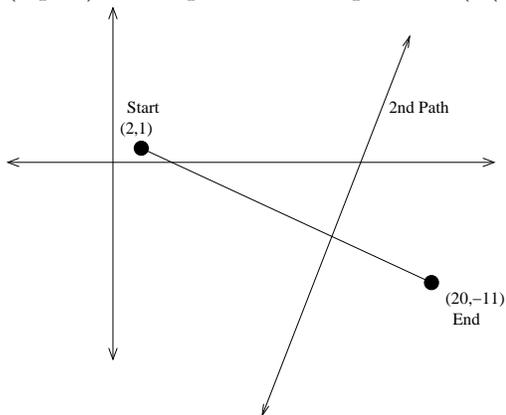
Problem	Total Points	Score
1	15	
2	15	
3	15	
4	15	
Total	60	

1. (15 pts.) The height in feet of the ocean tide above sea level at Hidden Beach is given by the sinusoidal function  $T(t) = 6\sin\left(\frac{2\pi}{12}(t - 5)\right) + 3$  where  $t$  is in hours after midnight. You like to go tidepooling, which is possible when the tide is below sea level. How many hours of tide pooling can you do each day if you get up at 6 AM each morning and go to bed at 10 PM?

\_\_\_\_\_ hours

2. (15 pts.) Dave likes to walk along a trail that begins at the point (2,1) and ends at (20,-11) (with coordinates imposed with Dave's house at the origin). He always starts at noon and reaches the end at 6 PM.

- (a) (7 pts.) Write parametric equations  $(x(t), y(t))$  giving his position at a time  $t$  (in hours).



$$x(t) = \underline{\hspace{2cm}}$$

$$y(t) = \underline{\hspace{2cm}}$$

- (b) (8 pts.) There is a 2nd path that lies on the line  $y = 3x - 49$  and intersects the path that Dave uses. At what time does Dave reach the intersection of the 2 paths?

\_\_\_\_\_ hours

3. (15 pts.) You are monitoring the population of rabbits around Green Lake. At the beginning of your study, you find that the population is 3125 rabbits. 5 months later, the population is at 7776 rabbits!!

(a) (8 pts.) What will the population be 1 year after the initial count if the population grows exponentially? (Round to the nearest rabbit)

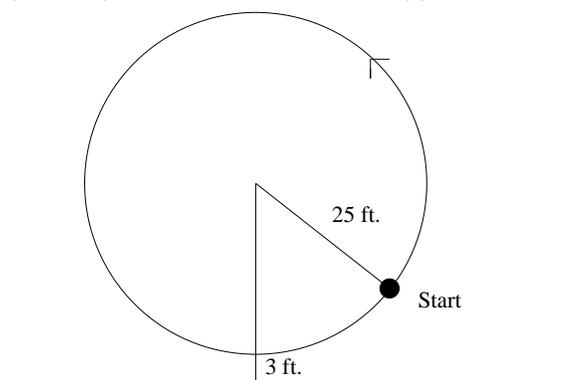
\_\_\_\_\_ rabbits

(b) (7 pts.) According to the model, when will the rabbit population be exactly 100 times the original amount?

\_\_\_\_\_ months

4. (15 pts.) Dave is on a ferris wheel that spins at a rate of 2 RPM, has a radius of 25 feet, and whose lowest point is 3 feet above the ground. Dave begins not at the base of the wheel, but at a point from which it take him 10 seconds to reach the top of the wheel as shown in the figure below. Let  $h(t)$  be Dave's height at time  $t$  (in minutes).

- (a) (10 pts.) Write a formula for  $h(t)$ .



$$h(t) = \underline{\hspace{2cm}}$$

- (b) (5 pts.) What is Dave's height 45 seconds after the ferris wheel starts?

                     feet