

Math 120 - Summer 2006
Midterm 2
August 3, 2006

Name: _____

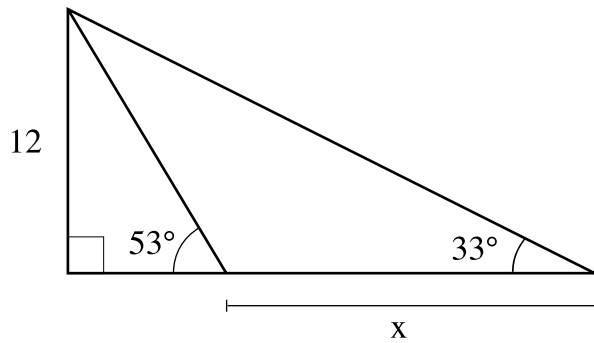
Section: C

| | | |
|-------|----|--|
| 1 | 10 | |
| 2 | 8 | |
| 3 | 7 | |
| 4 | 10 | |
| 5 | 15 | |
| Total | 50 | |

- You may use a calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.
- **When computing values of \sin , \cos , and \tan on your calculator, make sure you are using the correct angle mode (degrees or radians)!**
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 60 minutes to complete the exam.
- Good luck!

1. (10 points)

(a) Find the length x in the figure below.



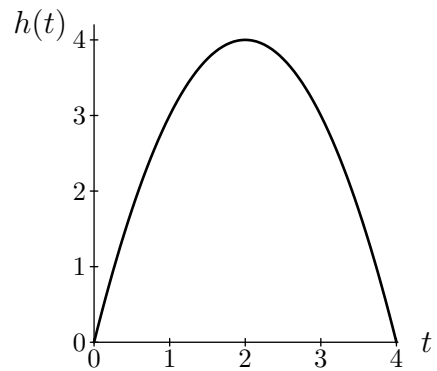
(b) Find all values of α (in radians!) between $-\pi$ and 2π that satisfy $\sin(\alpha) = -\frac{2}{3}$.

2. (8 points) On the old penny farthing bicycles, the pedals turn at the same angular speed as the large wheel. Suppose on the bicycle shown, the large wheel is 55 inches in diameter, and the small wheel is 19 inches in diameter.

Suppose you pedal at 2 revolutions per second. What's the angular velocity of the small wheel? How fast (in mi/hr) are you going?



3. (7 points) The height of a ball is given by $h(t) = -t^2 + 4t$, for $0 \leq t \leq 4$. Restrict the domain of $h(t)$ to where the height is increasing, and find the inverse function. What is the domain of the inverse function?



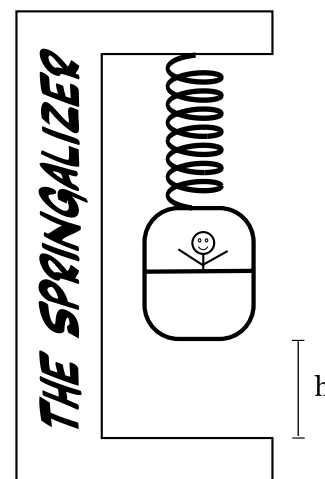
4. (10 points) Milo is working on his golf swing. The more he practices, the more accurate he gets. If he doesn't practice at all he can get within 35 feet of the hole; if he practices for 3 hours, he can get within 25 feet of the hole. No matter how much he practices, Milo cannot get closer than 10 feet. Assume that his accuracy is modeled by a linear-to-linear function.

(a) Find the function that gives his distance to the hole as a function of hours he practices.

(b) How much does Milo need to practice if he wants to get 15 feet from the hole?

5. (15 points) Remember Tiff, the carnival owner who tried to design the world's largest ferris wheel? Tiff has decided to create a new ride, called *The Springalizer*, where you bounce up and down in a box attached to a giant spring. She's had another vision, and wants the ride to work like this:

The box should be at its highest point, 10 feet off the ground, at $t = 2$ seconds after the ride starts; it should return to the highest point 7 seconds later. Finally, she wants the amplitude of the oscillation to be 6 feet.



- (a) Give a sinusoidal function $h(t)$ for the height of the box after t seconds.

- (b) Tiff tries the ride out, and the box crashes into the ground. When does this happen?

(c) What is the largest possible amplitude so that the box just touches the ground?