

Math 112-12 Exam 3 Part 2

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April 5, 2006

Instructions: Do each problem on a separate sheet of paper. Show all work for maximum credit. You may use your book, class notes, previous homework, online solutions to previous problems, and a calculator. Do not discuss the test with anyone other than me, and do not use a book other than the class text. Violation of these rules is cheating. The test is due Monday April 10 at the end of class without exception. If there are any questions about these instructions please ask me.

8 pts each

1. Find the dimensions of the right circular cone of minimum volume V that can be circumscribed about a sphere of radius 8 inches.
2. A hotel manager claims that if the room rental price is \$100 per night, he can rent 80 rooms; if the price is \$120 per night, he can only rent 70 rooms. Assuming a linear demand function, what is the elasticity of demand for his hotel rooms at the price of \$100?
3. Two parallel sides of a rectangle are being lengthened at the rate of 2 in/sec, while the other two sides are shortened in such a way that the figure remains a rectangle with constant area $A = 50in^2$. What is the rate of change of the perimeter P when the length of an increasing side is
 - a) 5 in?
 - b) 10 in?
 - c) What are the dimensions when the perimeter ceases to decrease?
4. When a bullet is fired into a sand bank, its retardation is assumed equal to the square root of its velocity on entering. For how long will it travel if its velocity on entering the bank is 144 ft/sec?

5. A new product is introduced in a certain area, and an advertising campaign promotes it. The percentage of the target population (potential purchasers) that has purchased the product after t days of advertising fits Newton's heating model.

a) After 10 days of advertising, 25% of the target population has purchased the product. Give the buying percentage as a function of the number of days of advertising.

b) The advertising campaign is costing \$500 per day, and the company figures that it makes a profit of \$7200 for each percent of the target population that buys the product. For how many days should the advertising campaign be run in order to maximize profit?