MATH 1311-05 **Calculus I** **Fall 2015**

Section 4.7: Applied Optimization

Discussion Dates: November 5

How do we solve an applied optimization problem?

1. If possible, draw a **good** picture and label with variables.
2. Define all of the variables from the picture.
3. Using the variables from the previous step and the problem statement, make a multivariable function to optimize.
4. Use the information from the problem to turn the function from the previous step into a function of a single variable and determine a domain, preferably closed, for which this function is valid.
5. Optimize the function from the previous step. The method of verifying that you have found the correct max or min will depend on whether or not the interval is closed.
6. Answer the appropriate question and make sure to label with the correct units.

Problem 1. Find positive numbers x and y such that their sum is 16 and the sum of their squares is a minimum.

Problem 2. Find positive numbers x and y such that their product is 100 and their sum is a minimum.

Problem 3. Find the dimensions of the isosceles triangle of largest area that can be inscribed in a circle of radius r.

Problem 4. A factory is located on one bank of a straight river that is 2000 meters wide. On the opposite bank and 4500 meters downstream is a power station from which the factory will draw its electricity. Electrical cable needs to be connected from the station to the factory, but it costs three times as much to lay underwater cable as opposed to aboveground cable. What path should the cable take from the power station to minimize the cost of laying the cable?

Problem 5. Find the point on the line $y = 2x - 3$ which is closest to the origin.