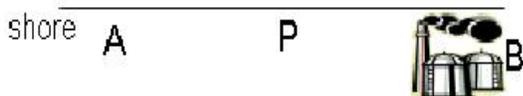


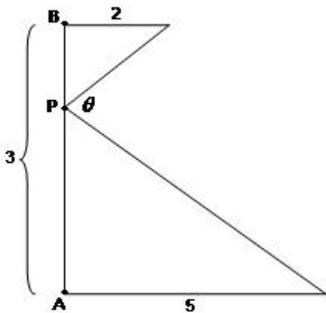
MA104 - Differential Calculus

Lesson 21: Problem Solving Lab 2

- (Easy/Medium) What is the largest possible area for a right triangle whose hypotenuse is 5 cm long?
- (Easy/Medium) An iron works company has contracted you to build a 500 ft^3 , square based, open top, rectangular steel holding tank for a paper company. The tank is to be made by welding $\frac{1}{2}$ inch thick stainless steel plates together along their edges. As the production engineer, your job is to find the dimensions for the base and height that will make the tank weigh as little as possible. What are those dimensions?
- (Medium/Hard) Upon graduating from USMA, you become a 2LT in the Corps of Engineers and are assigned as a platoon leader of a pipe-laying platoon. Your platoon has been deployed to a third world nation and you have been given the mission to lay some oil pipe from an offshore oil well to a refinery. The offshore oil well is located in the ocean at a point W, which is 5 miles from the closest shore point A on a straight shoreline (see the figure below). The oil is to be piped to the refinery at B that is 8 miles from point A by piping it on a straight line underwater from the oil well (point W) to some shore point P between A and B and then on to the refinery at B via a pipe along the shoreline. If the cost of laying pipe is \$100,000 per mile underwater and \$75,000 per mile over land, where should you place the point P to minimize the cost of laying the pipe? How much pipe will you need and what is the total cost of the project?



- (Medium/Hard) Where should the point P, in the figure below, be chosen on the line segment AB so as to maximize the angle θ ?



- Section 4.7 Problem 33. This was a do problem from Lesson 18. It illustrates very nicely the need for a careful final analysis of each optimization problem you do...