

MA 137 Worksheet #22

Section 5.4

10/29/20

1. Set up and solve the following optimization problems:

- (a) If the product of two positive numbers is 180, what is the smallest that their sum can be? Keep in mind the numbers need not be integers.

- (b) Wire with a total length of 450 inches will be used to construct the edges of a rectangular box, and thus provide the frame for the box. The base of the box must have a width that is three times the length. What are the volume of the largest possible box that can be made subject to these constraints and its dimensions at that volume?

- (c) A flexible tube of length 4 m is bent into an L-shape. Where should the bend be made to minimize the distance between the two ends?

- (d) An oil company needs to run a pipeline to a nearby station. The station and oil company are on opposite sides of a river that is 1 km wide, and that runs exactly west-east and the station is 10 km east along the river from the the oil company. The cost of building pipe on land is \$200 per meter and the cost of building pipe in water is \$300 per meter. Set up an equation whose solution(s) are the critical points of the cost function for this problem. Find the least expensive way to construct the pipe.

- (e) A 10 meter length of rope is to be cut into two pieces to form a square and a circle. How should the rope be cut to maximize the enclosed area?