

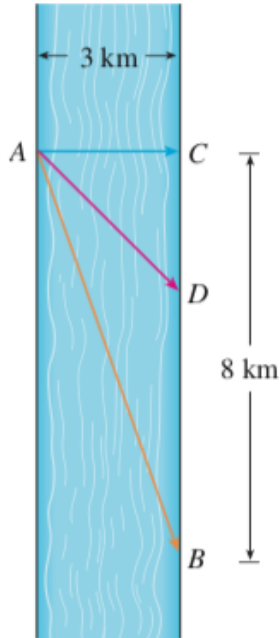
Homework #13: Optimization

Note: Your work can only be assessed if it is legible. You are welcome to use a calculator for this assignment. This portion will be done in class.

1. A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fence along the river. What are the dimensions of the field that has the largest area?

2. A cylindrical can is to be made to hold 1000 cm^3 of oil. Find the dimensions that will minimize the cost of the metal to manufacture the can.

3. A man launches his boat from point A on a bank of a straight river, 3 km wide, and wants to reach point B , 8 km downstream on the opposite bank, as quickly as possible. (See below.) He could row his boat directly across the river to point C and then run to B , or he could row directly to B , or he could row to some point D between C and B and then run to B . If he can row 6 km/h and run 8 km/h, where should he land to reach B as soon as possible?



Note: You are responsible for this portion.

4. Find two numbers whose sum is 100 and whose product is a maximum.

5. An open box with a square base will be constructed using 300 in^2 of cardboard. What are the dimensions of such a box with the largest possible volume?

6. An oil refinery is located on the north bank of a straight river that is 2 km wide. A pipeline is to be constructed from the refinery to storage tanks located on the south bank of the river 6 km east of the refinery. The cost of laying pipe is \$400,000/km over land to a point P on the north bank and \$800,000/km under the river to the tanks. To minimize the cost of the pipeline, where should P be located?