

Math 221 Homework #11

Hints for these problems:

- Draw a picture!
- Determine which quantity is to be maximized or minimized. Express this quantity in terms of other variables or parameters (the “master equation”).
- Formulate any additional equations relating those variables or parameters based on other information given in the statement. Solve these equations for one of the variables and plug into the master equation to get a function of a single variable only. Use physical intuition to determine the domain of allowed values for this variable.
- Use calculus techniques to determine critical points. Find the maximum or minimum. Don’t forget to check the endpoints!
- Make sure to provide a verbal conclusion, interpreting your mathematical answer in terms of the original word problem.

1. [SM] 3.7 # 16.

2. [SM] 3.7 # 19,20.

3. Find the dimensions of the rectangle of largest area that has its base lying along the x -axis, and whose other two vertices lie above the x -axis on the parabola $y = 20 - \frac{1}{4}x^4$. What is the area of this rectangle?

4. [SM] 3.7 # 34.

5. A boat leaves a dock at 2:00 P.M. and travels due south at a speed of 20 km/h. Another boat has been heading due east at 15 km/h and reaches the same dock at 3:00 P.M. At what time were the two boats closest together? At that time, what was the distance between them?