

Exercise 6

Applications of Derivative: Optimization

1. A box with a square base is to be constructed. Suppose that only 10 m^2 of material is available to use in construction of the box. Assume that all the material is used in the construction process. Determine the maximum volume that the box can have.
2. We want to construct a box whose base length is 3 times the base width. The material used to build the top and bottom cost $\$10/\text{ft}^2$ and the material used to build the sides cost $\$6/\text{ft}^2$. If the box must have a volume of 50ft^3 , determine the dimensions that will minimize the cost to build the box. What is the corresponding minimum cost of this box?
3. We want to print a poster that has a total area of 200 in^2 with 1 inch margins on the sides, a 2 inch margin on the top and a 1.5 inch margin on the bottom. Determine the dimensions of the poster that will give the largest printed area.
4. At midnight, ship A is 50 km north of ship B. Ship A is sailing south at 20 km/h. Ship B is sailing west at 10 km/h. At what time will the distance between the ships be a minimum?
5. Determine the area of the largest rectangle that can be inscribed in a circle of radius 4 cm.
6. Find the point on the graph of $y^2 = 2x$ closest to $(2, 0)$.