

MATH 135 – Calculus 1
Review on Optimization
December 11, 2019

Practice Problems

Solve the following optimization problems:

1. Let x, y be two non-negative numbers such that $2x + y = 100$. What is the maximum value of xy^2 ?
2. What is the maximum area of a rectangle inscribed in a $3 - 4 - 5$ right triangle? Assume the sides of the rectangle are parallel to the sides of length 3 and length 4.
3. All units in a 100-unit apartment building are rented out when the monthly rent is set at $r = 900$ dollars per month. Suppose that one unit becomes vacant with each 10-dollar increase in the monthly rent and each occupied unit costs 80 dollars per month in maintenance. What rent r will maximize the monthly profit of the building landlord?
4. Your job is to design a rectangular industrial warehouse consisting of three separate rectangular rooms of equal areas formed by two interior walls parallel to two of the exterior walls. The wall materials cost 500 dollars per linear meter and the company allocates 2,400,000 dollars for the portion of the project consisting of the walls. What dimensions will maximize the floor space (i.e. area) of the warehouse?
5. A billboard of height b is mounted on an outside wall of building with its bottom at a distance h from the pavement as in Figure 30 in our book. At what distance x from the wall should an observer stand to make the billboard appear largest? (That is, we want to maximize the angle subtended by the billboard at the eye of the observer.)