

Lesson 10

Min/max problems

A min/max problem is a modeling problem where you need to minimize/maximize a quantity q .

In this class $q = q(x) = ax^2 + bx + c$

The min / max is at the vertex of the parabola

Rosalie is organizing a circus performance to raise money for a charity. She is trying to decide how much to charge for tickets. From past experience she knows that the number of tickets sold is a linear function of the price. If she charges 5 dollars per ticket , she can sell 1000 tickets, if she charges 7 dollars she can only sell 900 tickets. How much should she charge per tickets to make the most money ?

A ball is kicked in the air. The height of the ball with respect to the horizontal is given by $y = -2x^2 + 4x + 2$ (in feet). The ground slopes down like in the picture below. what is the maximum height reached by the ball ?

You have 720 m of fencing with which to build 3 enclosures. Two are identical squares and one is a rectangle that is twice as long as it is wide. What should be the dimensions of the squares to minimize the combined area of all three enclosures ? What should be the dimensions of the squares to maximize the combined area of all three enclosures ?

An American Airlines plane is flying North at a speed of 200 mph. At time $t = 0$ it is located 100 mi South of a control tower. A United Airlines plane is flying in a straight line towards the control tower with a speed of 150 mi/hour. At time $t = 0$ it is located 50 mi East and 100 mi South of the control tower. When are the planes closest ? How close do they get ?