

Topic 18: Optimization

1. A three-sided fence is to be built next to a straight section of river, which forms the fourth side of a rectangular region. The enclosed area is to equal 1800 ft^2 . Find the minimum perimeter and the dimensions of the corresponding enclosure.
2. A box with no top is to be built by taking a 6 inch by 10 inch sheet of cardboard and cutting x -inch squares out of each corner and folding up the sides. Find the value of x that maximizes the volume of the box.
3. A water line runs east-west. A town wants to connect two new housing developments to the line by running lines from a single point on the existing line to the two developments. One development is 3 miles south of the existing line; the other development is 4 miles south of the existing line and 5 miles east of the first development. Find the place on the existing line to make the connection to minimize the total length of new line.

Answers

1) 30' by 60'; the perimeter is 120'

2)
$$\frac{64 - \sqrt{64^2 - 4(12)(60)}}{2(12)}$$

3) $15/7$ miles east of the first development