Fencing a Garden

C. Witt

Grade: 100

Abstract	Nice introduction to the problem by adding a little bit of context. Although I wonder why you decided to also state the original problem?
Procedure	Nice use of color in the equations and the graph. That makes it easier for the reader to follow your arguments.
Conclusion	I really like the reflection piece at the end of the paper where you talk about the things you have learned as a result of working on this project. Great job in doing the work to figure out how to do some extra things.

List of Comments

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Fencing a Livestock Pen

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October 14, 2016

Abstract

You are working over the summer at a fencing company. The client that you are currently working with owns a small ranch. This client asks you to fence off a large rectangular livestock pen. However, the client has only given you enough money for 140 feet of fencing. Your job is to make a livestock pen with the largest area possible. The client has also asked you to model a function for possible areas of the livestock pen.

Original Problem: A gardener has 140 feet of fencing to fence in a rectangular vegetable garden. Find a function that models the area of the garden she can fence. For what range is the area greater than 825 square feet? Can she fence a garden with area 1250 square feet? Find the dimensions of the largest area she can fence.

Procedure

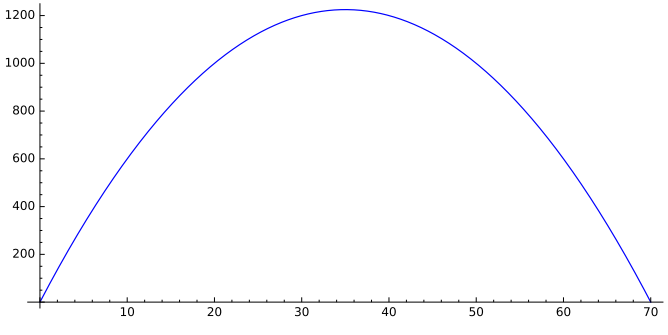
In order to solve this problem, you must know a few base equations.

1. Perimeter of a rectangle: $P = 2l + 2w$ where l is length, and w is width.
2. Area of a rectangle: $A = lw$ where l is length and w is width.

I then plugged in the given perimeter of 140 and solved the equation in terms of l. To get the final function, plug in the solved value of l into the area formula. The function should then be in terms of w.

We have now found a function for the area of the rectangle in terms of its width!

$$140 = 2w + 2l$$
$$\downarrow$$
$$2l = 140 - 2w$$
$$\downarrow$$
$$l = 70 - w$$
$$\downarrow$$
$$A(w) = wl$$
$$\downarrow$$
$$\mathbf{A(w) = w(70 - w)}$$



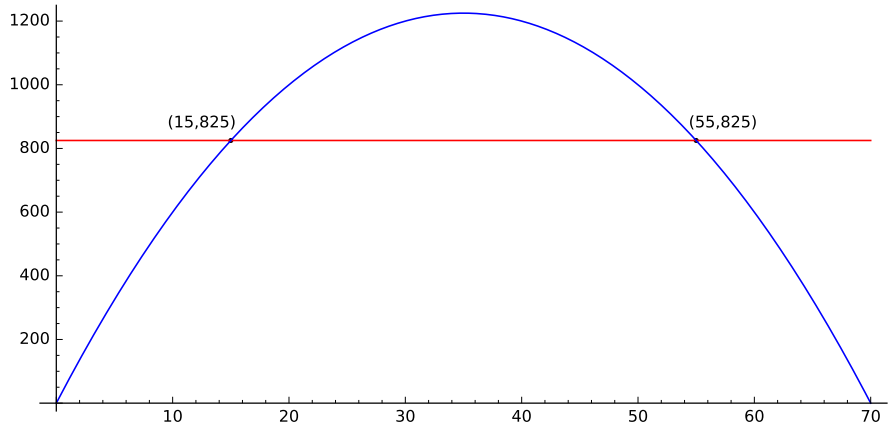
When answering the second part of the question (For what range is the area greater than 825 square feet?), simply draw the line $y = 825$ onto the pre-existing graph. Any value of $A(w)$ above the line is on the range of areas greater than 825 feet.

$$A(w) = w(70 - w)$$

and

$$F(w) = 825$$

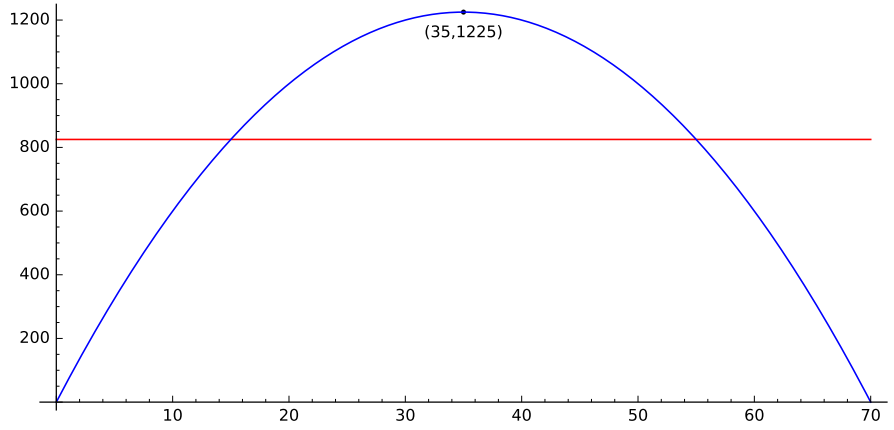
yields



From this graph, you can determine that in order to have an area greater than 825 feet, you must have a width in this limit: $15 < w < 55$.

To find the maximum area you can fence, simply find the max y-value for $A(w)$.

y-value and not y-value



From this graph, you can determine that maximum possible area the gardener can fence is 1225 square feet. Therefore, you **cannot** fence a garden with an area of 1250 square feet.

Conclusion

Key Points:

1. Formula for area: $A(w) = w(70 - w)$
2. The maximum area you can fence is 1225 square feet
   - length: 105 feet
   - width: 35 feet

3. In order to have an area greater than 825 square feet, the width of the livestock pen must be greater than 15 feet but less than 55 feet.

Analysis:

This was a very fun first project. While the problem was not difficult, I enjoyed getting to know SageMathCloud and the LaTeX programming language. While the basics of LaTeX are straightforward, some issues such as spacing and font size troubled me. In addition, the SageMath Worksheets are very confusing to me. For example, in order to make the graphs, I had to copy and paste Mr. Abell's example code into a new SageMath Worksheet and plug in my own values and restrictions. But, while challenging, I was abel to add little nuances such as color and point labels to the SageMath Worksheet.

shouldn't this be able?