This is a sample Lab assignment for Calc III. It is based on a Calc I style optimization problem, and this is intended to show examples of "good" and "bad" lab write-ups. This lab would be considered "bad" and would likely result in a grade in the 'C' range, or lower. Note: Your lab should be double spaced and have a title page. This is single spaced so it fits on one page

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1 Introduction

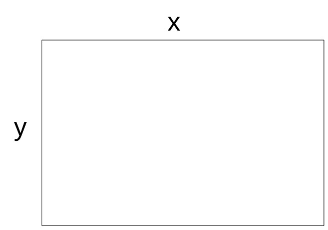
To celebrate the acquisition of Styria in 1261, Ottokar II sent hunters into the Bohemian woods to capture a unicorn. To display the unicorn at court, the King wants to build a rectangular cage. The material for the three sides of the cage cost 3 ducats per running cubit, while the fourth wall was to be guilded (covered in gold) and cost 51 ducats per running cubit.

In 1261, it was well known that a happy unicorn requires an area of 2500 square cubits. Of course, the King wanted to build a cage that would keep the unicorn happy, but not cost him his whole kingdom!

In this lab we will find the optimal dimensions of a cage for this unicorn's cage. We will use the calculus idea that a function is minimized when its derivative is zero.

2 Body

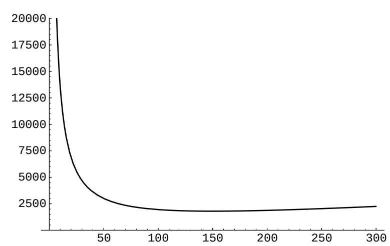
1) Let x be the length of the longer side, and y be the length of the shorter side.



2) The cage should be a rectangle. Since one side costs more that side will be shorter.

3) The area of a rectangle is $A = xy$. The area of our cage is 2500, so $xy = 2500$. The cost of the cage is the cost of the sum of the 4 sides. As a function of x, $c(x) = 6x + 135000/x$.

4)



5) Since $c(x) = 6x + 135000/x$, $c'(x) = 6 - 135000/x^2$. This is zero when $x = 150$. So, the cost of the cage is cheapest when $x = 150$.

6) Since the cost of all the sides is the same, the cage should be a square.

7) To have a cage with an area of 2500, the long side should be 150, and the short side should be 16.66666.

3 Conclusion

We helped the King find the dimensions of the cheapest possible cage. It is a rectangle. If the cost was the same for all four sides, the cage should be square.