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Calculus 166 Reflection

Optimization

Optimization is a process that utilizes, in part, calculus to assist in finding the most effective use of materials or goods. Optimization has many applications other than what was studied in class. However, what was covered in the classroom is what is pertinent to this reflection. Therefore, this week the perimeter and areas of unique enclosures were examined from the perspective of the optimization process.

To begin there is usually a set of givens and wants hidden in the explanation of the problem. It is the job of the reader to vet these out. Although the problem may not seem to have much background information, there may be assumptions that can be made; for example, the area or volume of a circle. A diagram will also need to be drawn to assist in visualizing what is going on. From here an equation can be established. There will be more than one variable in the function which will make it hard to solve, so one of the variables will need to be isolated from the function, allowing it to be expressed in terms of the other variable.

Next, take the derivative of the newly-simplified function to determine the critical values. A domain should be established at this point of the problem solving. This is the set of values that X and Y could be that make sense to the problem. For example, when building a fence, you cannot have a negative side length. In addition, an upper and lower limit to the function should be established. After the critical values are determined to be within the domain restrictions, one is able to test them by plugging adjacent values into the derivative to determine whether the slope is positive or negative on either side. This determines whether the critical value being tested is a minimum, and if it is, the slope to the left of this point should be negative and the slope to the right should be positive. In some cases, the minimal critical value could be the answer to the problem, but is usually just another step towards obtaining the answer.

Finally, the isolated variable has to be solved for. To do this the critical value, this was variable one, can be placed back into the isolated function for variable two in its proper place. After an answer is obtained all that has to be done is to plug both variables back into the original function to determine the final optimal value.