Math 170  

Calculator Finding Max/Min Points

Graphing calculators have the ability to find maximum and minimum points on the graph of a function. If you use these features on a written assignment or exam, here are some things you need to know.

1. Your instructor, or the instructions in the problem, may require a calculus solution. If so, put away your calculator — you must show all work to find the critical points and determine if each critical point is a maximum, minimum or neither.

2. The calculus method can work for functions with unknown constants. Graphing calculators maximum/minimum tools only work for functions that can be graphed.

3. The calculus method requires finding the solutions to the equation $f'(x) = 0$. If you use a calculator to find the derivative or solve this equation, show your work.

4. Pay attention to your instructor’s and problem requirements. If a problem requires using calculus, show all algebraic work. Calculator solutions will only earn partial credit. Check with your instructor if you have doubts or questions.

5. If you use your calculator, you must communicate how you used your calculator and the output you got. In general you must (1) say what function or feature you used, (2) replicate whatever you typed into the calculator, and (3) state or show what came out of the calculator.

   Here are two examples of what you might do and how to show your work. Suppose you want to find the minimum of the function

   $$f(x) = \frac{10}{x} + 50x, \quad x > 0$$

   • Suppose you used the graphing calculator’s minimum tool.
     
     “I graphed the following function on my calculator.”
     
     $y_1 = 10/x + 50x$
     
     “Using the minimum tool I found the minimum point: (0.4472, 44.721).”

     [Include a sketch of the graph (properly labeled) on your screen.]

   • Suppose you wanted to use a calculator’s equation solving tools.
     
     “The minimum occurs when $f'(x) = -10/x^2 + 50 = 0$.”
     
     [Insert work for how you found the solution $x = 0.4472$.]
     
     [Insert work to show the critical point is a minimum.]
     
     “The minimum value occurs when $x = 0.4472$, and is $f(0.4472) = 44.721$.”

6. If you have doubts or questions on if it is appropriate to use your graphing calculator and what work is required, ask your instructor.