WORKSHEET: FINDING THE ABSOLUTE MINIMUM AND MAXIMUM 2

Names and student IDs: _____

Recall the method for maximizing and minimizing a continuous function f on a closed interval $[a, b]$:

(1) Find all the critical numbers c of f in $[a, b]$, that is, numbers c in $[a, b]$ such that $f'(c) = 0$ or $f'(c)$ does not exist.
(2) Evaluate f (**not** f'!) at all the numbers c found in (1) and at the endpoints a and b.
(3) The absolute maximum of f on $[a, b]$ is the largest value you got in (2). It occurs at the value of x you used to produce it. (In rare cases, the absolute maximum can occur at more than one value of x.) Similarly, the absolute minimum of f on $[a, b]$ is the smallest value you got in (2), etc.

Let $f(x) = x^3 - 6x^2 + 16$. Use the methods of calculus to find the exact values of x (*not* calculator approximations) at which f has its maximum and minimum values on the interval $[-1, 2]$.

The problem does not ask you to find the exact maximum and minimum values of f on the interval, only the exact values of x at which they occur.

1. Find all critical numbers of f.

2. Which critical numbers are in $[-1, 2]$?

3. List the values of x at which one should evaluate f according to Step (2) at the top of the page.

4. Evaluate f at each of the numbers just found. No calculator should be needed. Remember that you won't have one on the exams. (Do **not** evaluate f' at those numbers! But **do** explain why it is not helpful to do that.)

5. Where does f take its absolute minimum and maximum values on $[-1, 2]$?

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