WRITING SAMPLE

MATH 112

Problem. *Find the maximum and minimum values of $f(x) = 2x^3 - 3x^2 - 36x + 15$ and their locations on the interval $[-3, 5]$.*

Solution. Since f is differentiable and the interval is closed and finite, the extreme values exist and occur either at the end points or at critical points (where the derivative is zero).

Differentiating and factoring, we have

$$f'(x) = 6x^2 - 6x - 36 = 6(x - 3)(x + 2).$$

From this we see that the critical points are $x = 3$ and $x = -2$, which are both in the interval. Checking the values here and at the end points we get

$$f(3) = -66, \qquad f(-2) = 59, \qquad f(-3) = 42, \qquad \text{and} \qquad f(5) = 10.$$

Thus, the maximum is 59, which occurs at $x = -2$, and the minimum is -66, which occurs at $x = 3$.

COMMENTS

A good write-up is an explanation to the reader. An explanation is more than a report of your findings or a summary of what you did. It is a guide for the reader to understand your reasoning.

A write-up can briefly remind the reader of the general theory (which is done in the first sentence of the solution), but doesn't need a lengthy discussion of the general procedure. Instead the solution should illustrate the procedure.

A write-up should not include trivial algebra and arithmetic, but should include algebra that is used to draw conclusions (the factored derivative in this case).

A write-up need not be long, but it needs to include enough of the computations and reasoning so that the reader can easily follow them and understand why the author believes the solution is correct.

Everything should be included in a sentence (the only exceptions are pictures and graphs), and the beginning and ending of each sentence should be clear.