

Assignment 4.1 - Question 1

Question: $f(x) = x^4 - 32x^2$. Enter the critical points in increasing order.

(a) Use the derivative to find all critical points. x_1 , x_2 , and x_3

(b) Use a graph to classify each critical point as a local minimum, a local maximum, or neither.

$x_1 = _$ is (a local maximum / a local minimum / neither). ($_$ refers to value of x)

Answer it in that format. Do the same for x_2 and x_3

Prompt 1 (Explain the question's goal and core concept clearly.):

This question is asking us to find where the function $f(x) = x^4 - 32x^2$ has **critical points**, which means finding where the slope of the function is **zero** or **undefined**. This is basically what we need to do. If you are facing difficulty understanding what a critical point is, go refer back to your notes or just ask our chatbot! If you are looking for how to find critical points and what the process is click on the second prompt.

Prompt 2 (Unclear on how to apply the concept to the question and connect the dots):

We need to:

1. **Take the derivative** of $f(x)$ to find where the slope is zero.
2. **Set the derivative equal to zero** and solve for x .
3. **Use factoring** to break down the equation into simpler terms.
4. **Solve for x** to find the critical points.
5. **Use a graph** to determine whether each critical point is a **local max or min** by checking how the function behaves around those points. (Use desmos here!)

Prompt 3 (Analyzing past students mistakes + reviewing solutions if inputted)

Potential Mistakes:

1. Since $x = 0$ is not a clear maximum of the graph (i.e. it is not the highest the graph goes), students may be inclined to label it as neither a local max or a local min, even though it is a local max.
2. If you divide both sides by x in this step $x(x^2 - 16) = 0$, you will miss $x = 0$ as a critical point.