

Checklist for Analyzing Functions

This short checklist may be helpful in finding critical values (critical numbers), maximum and minimum values, inflection points, graphs and other important characteristics of a function $y=f(x)$. Use it along with a good dose of common sense. The First and Second Derivative Tests present more formal approaches to the same goal.

Given $y = f(x)$, do the following:

1. Look at your function. Where are its points of discontinuity, if any? Where are its zeros? Are there any obvious points that you can plot on the graph immediately? Are there any obvious asymptotes?
2. Take the derivative of the function. (It describes the slope of the function at corresponding values of x .) At what values is the derivative zero? Undefined? (These values are your critical numbers.) What are the corresponding values of the function at these critical numbers? Plot the corresponding points.
3. Take the second derivative. (It describes the concavity of the function.) What is the sign of the second derivative at the critical numbers found above? At what points is the second derivative equal to zero? (These “hypercritical points” are possible points of inflection.)
4. If a clear picture of the graph of the function has not yet emerged, plot a few points on the function and check the slope (derivative) at those points.