Graphing

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$f(X)$ is a function on a domain I, which is usually an interval.

Step 1: Write down where f is defined clearly, int arms of sub-intervals and note down the points where f is not defined.

Step 2: Compute $f'(x)$ and $f''(x)$ correctly; note down points where they are not defined.

Step 3: Write down the intervals for f where it is defined, and analyze the behaviour of f' in these intervals. This will give you the interval where f is increasing or decreasing; increasing if $f' > 0$, and decreasing if $f' < 0$.

Step 4: Find the critical points of f (points c where $f'(c) = 0$ of $f'(c)$DNE. Note that points where f or f' are not defined are points of interest but if $F(c)$ is not defined, c is not a critical point.

Step 5: At these critical points where $f'(c) = 0$ analyse whether they are local minimum or local maximum. You may use the first derivative test or the second derivative test to do this ($f''(c) > 0$ means local minimum and $f''(c) < 0$ means local maximum).

Step 6: Analyse the concavity of f in the intervals: If $f''(x) > 0$ on I, then f is concave up. If $f''(x) < 0$ on I, then f is concave down.

Step 7: Identify the inflection points: A point c is an inflection point if f is continuous at c and changes concavity at c.

Step 8: Study the existence of asymptotes and note them down (see notes on asymptotes). Analyse the end behaviour of the function.

Step 9: Write down the x and y-intercepts: x-intercepts are obtained as the roots of $f(x)$ i.e find the x such that $y = f(x) = 0$. For y-intercepts, put $x = 0$ and write down the value of y.

Step 10: Put all the information obtained together and draw the graph.