A suggested outline for sketching the curve $y = f(x)$

This sequence of steps usually works fairly well. However, in some cases you might want to vary the order a bit or add some other things you want to check to get the best possible sketch.

What is the domain of $f(x)$? Does the formula for $y = f(x)$ allow you to "rule out" parts of the grid where no part of the graph will be?

Plot any points where it's very easy to evaluate f

Are there any vertical asymptotes (are there any points a for which $\lim_{x \to a} f(x) = \pm\infty$?)

Find any points (*critical points*) where $f'(x)$ does not exist or where $f'(x) = 0$. Plot these points: use a calculator, if necessary, to evaluate f at each critical point. (*Indicate somehow in the picture, just for yourself, whether each is a point where* $f'(x) = 0$ *or where* $f'(x)$ *does not exist.*)

Determine the intervals on which f is increasing or decreasing. This will tell you also which critical points are local maxima or minima.

Find points where $f''(x)$ does not exist or $f''(x) = 0$: these points are candidates for inflection points.

Determine the intervals of which $f''(x)$ is positive or negative (= intervals on which $f'(x)$ is increasing or decreasing). Use this information to determine whether f is concave up (CU) or concave down (CD) on these intervals.

Using this information locate any inflection points and plot them.

Are there any horizontal asymptotes: check $\lim_{x \to \infty} f(x)$ and $\lim_{x \to -\infty} f(x)$