

Steps in graphing $y = f(x)$

1. Compute f', f''
2. Determine *interesting* points:
 - Zeros ($f(x) = 0$; if possible)
 - Critical points ($f'(x) = 0$ or undefined)
 - Points where $f''(x) = 0$
3. Determine where f is increasing, decreasing
4. Determine where f is concave up, concave down
5. Plot enough of the interesting points (or other easy points) to anchor the graph
6. Examine function near points where f is not defined; discover *vertical asymptotes*, i.e. lines $x = c$ where $\lim_{x \rightarrow c^+} f(x) = \pm\infty$ or $\lim_{x \rightarrow c^-} f(x) = \pm\infty$
7. Examine behavior at endpoints of domain; discover *horizontal asymptotes*, i.e. lines $y = c$ where $\lim_{x \rightarrow \infty} f(x) = c$ or $\lim_{x \rightarrow -\infty} f(x) = c$
8. Transfer this information to the graph; label well, indicate extrema and critical points if required.