

For each of the functions in problems 1, 2, 5, 6 below, the goal is to sketch the graph. Generally follow the following steps to get the complete graph.

- (a) Determine the domain and check if the function has any symmetry. (Is it even or odd function?)
- (b) Find the derivative and find the coordinates of the critical points (if any).
- (c) Use a sign chart (table) to find the intervals on which f is increasing; on which f is decreasing.
- (d) Determine the type of critical points (relative minimum, relative maximum or neither).
- (e) Compute f'' and find the intervals on which f is concave up; on which f is concave down.
- (f) Find the coordinates of all inflection points (if any) .
- (g) Does the function have any asymptotes (vertical or horizontal)? Justify with limits.
- (h) Axis intercepts.
- (i) Graph the function.

1. Sketch the complete graph of $f(x) = x^4 - 6x^2 + 5$.

2. Sketch the complete graph of $f(x) = x(x - 4)^3$.

3. True or False questions. In each case answer and briefly justify your answer.

(a) If $f'(2) = 0$, $f'(x) < 0$ if $x < 2$ and $f'(x) > 0$ if $x > 2$ then f has a relative minimum at $x = 2$.

(b) If $f'(2) = 0$ then f has a relative minimum or a relative maximum at $x = 2$.

(c) If $f'(2) = 0$ and $f''(2) > 0$ then f has a relative maximum at $x = 2$.

4. Sketch (if possible) the graph of a function $f(x)$ so that $f(x) > 0$, $f'(x) < 0$, $f''(x) > 0$ for all real numbers x .

5. Sketch the complete graph of $f(x) = e^{-x^2}$.

6. Sketch the complete graph of $f(x) = \frac{2x+1}{x+1}$.