## Worksheet 03/21/17: Graphing

NAME: \_\_\_\_\_

For each of the functions in problems 1, 2, 5, 6, 7 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. Note that "relative" minimum/maximum is the same as "local" minimum/maximum.
- (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  $f(x) = \frac{2x+1}{x+1}$ .
- **6.** Sketch the complete graph of  $f(x) = e^{-x^2}$ .
- 7. Sketch the complete graph of  $f(x) = \sqrt[3]{x} \ln |x|$ .