Worksheet 03/26 **Group** _____ **NAMES:** _____

1. (a) Find all critical points of the function $f(x) = x(4-x)^3$.

(b) Determine the absolute minimum and the absolute maximum for the function $f(x) = x(4-x)^3$ when restricted to the interval $[0, 5]$.

(c) Same question as in (b) when $f(x) = x(4-x)^3$ is restricted to the interval $[3, 5]$.

2. (a) Sketch the graph of $f(x) = |x|$ restricted to the interval $-2 \leq x \leq 1$ and determine whether the function has any absolute extreme values on this domain.

(b) Same question as in part (a), but with the function $f(x) = |x|$ restricted to the domain $-2 < x < 1$. Does your answer contradict the Extreme Value Theorem?

Sections 4.3 and 4.4 will be devoted to graphing functions. Generally the following steps are useful in getting a complete graph, although the order for these steps is not necessarily the one below.

(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 (or table) for f' 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) Does the function have any asymptotes (vertical or horizontal)? Justify with limits.
(f) Compute f'' and find the intervals on which f is concave up; on which f is concave down.
(g) Find the coordinates of all inflection points (if any) .
(h) Axis intercepts.
(i) Graph the function.

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

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

5. Sketch the complete graph of $f(x) = \frac{x^2}{3x^2+1}$