## HOMEWORK 4 - MATH 112 DUE DATE: Monday, February 14 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

## GOOD LUCK!!

- 1. Find the critical numbers, create the appropriate table and find the intervals on which  $f(x) = x^3 6x^2$  is increasing or decreasing.
- 2. Find the critical numbers, create the appropriate table and find the intervals on which  $f(x) = (x^2 9)^{2/5}$  is increasing or decreasing.
- 3. Use the first derivative test to find all relative extrema of the function  $f(x) = x^4 12x^3$ .
- 4. Find the absolute extrema of the function  $f(x) = x^3 12x$  in the closed interval [0, 4].
- 5. Do a complete study (monotonicity, extrema, concavity, inflection points and sketch) of the graph of  $f(x) = x^4 18x^2 + 5$ .
- 6. Do a complete study (monotonicity, extrema, concavity, inflection points and sketch) of the graph of  $f(x) = \frac{3}{1+x^2}$ .
- 7. The combined perimeter of an equilateral triangle and a square is 10 units. Find the dimensions of the triangle and the square that produce a minimum total area.
- 8. Use a complete analysis (domain, intercepts, asymptotes, monotonicity, extrema, concavity, inflection points and sign information) to roughly sketch the graph of the function  $f(x) = \frac{x}{x^2-4}$ .