EXAM 2 - MATH 112 YOUR NAME:

Friday, February 28 George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider $f(x) = x^3 - 3x^2 - 9x + 7$. Create the combined sign table for the first and second derivatives and explicitly mention the relative min/max points and the inflection points. (You are not required to sketch the graph.)

- 2. Consider $f(x) = \frac{x^2}{4 x^2}$.
 - (a) Find the domain:
 - (b) Find the vertical asymptotes if any:
 - (c) Find the horizontal asymptotes if any:
 - (d) Create a sign table involving the first derivative (**not** the second) (explicitly showing monotonicity and relative extrema):

(e) Sketch the graph of the function using the asymptotes and the information gathered above.

3. Find the absolute extrema of the function $f(x) = \frac{x}{x^2 + 1}$ on the interval [-3, 3].

4. A store can sell 12 TV sets per day at a price of \$200 each. The manager estimates that for each \$10 price reduction, she can sell 2 more sets per day. If each TV costs the store \$80, what is the price that maximizes the company's profit? (Hint: Let x be the number of \$10 price reductions and write equations for revenue, cost and profit.)

5. Find an equation for the tangent line to the graph of $y^3 - y^2 - y = x$ at the point (x, y) = (2, 2).