Math 234 Practice Problems for Exam II

1. Differentiate the following functions

   (a) $f(x) = \sqrt{x^2 - 2x}$

   (b) $g(x) = \dfrac{1}{5x^2 - 6x + 2}$

   (c) $h(t) = \sqrt{1 + \dfrac{1}{t}}$

2. Compute $\dfrac{dy}{dx}$ of the implicitly defined function

$$x^2 - yx^2 + y^3 + 1 = 0$$

3. List all critical numbers and critical points of the function

$$f(x) = \begin{cases} x^2 + 4x - 2 & x < 2 \\ -x^2 + 6x - 5 & x \geq 2 \end{cases}$$

4. Find the intervals of increase and decrease of the function

$$f(x) = \frac{1}{x^2 + 4x - 5}$$

5. Find where the following function is concave upward and concave downward. Find the coordinates of all inflection points

$$f(x) = x^5 - 5x^4$$

6. Determine all vertical and horizontal asymptotes of the graph of

$$f(x) = \frac{x^2 + 3x}{x^2 - 4}$$

7. Sketch the graph of the following function. Indicate all intercepts, relative extrema, points of inflection.

$$f(x) = x^3 - 6x^2 + 9x$$

8. Find the global maximum and the global minimum of the function

$$f(x) = x + \frac{4}{x}$$

on the interval [1,3].

9. When a particular commodity is priced at p dollars per unit, consumers demand $q = \dfrac{2000}{p^2}$ units. Find the elasticity of demand for this commodity, and determine if the demand is elastic, inelastic or of unit elasticity when $p = 5$.