Math 1271 **Name:** _____

Worksheet: 2.7 2.8 3.1 3.2; including 2.1-2.6

1. Compute the derivative of the following functions

$$e^x(x^4+1) \qquad \frac{x}{x^2-1}$$

2. Let $f(x) = 2x^2 - x + 1$. Find the equation of the tangent line of f whose slope is 1.

3. Let $f(x) = k \cdot x^2$. Find the value of k such that $y = 2x + 2$ is a tangent line of $f(x)$.

4. Find the vertical and horizontal asymptotes of the function

$$\frac{x^4 + 1}{x^2 - x^4}$$

5. Evaluate the following limits

$$\lim_{x\to 2}\frac{\sqrt{2x}-2}{x^2-4} \qquad \lim_{x\to 0^+}\arctan(\ln(x)) \qquad \lim_{x\to 1}e^{x^3-x}$$

6. Determine the continuity (or discontinuity) of the following function. If it is discontinuous at a certain point, describe its type of discontinuity.

$$f(x)=\begin{cases} x^2 & \text{if } x\le -1 \\ 3-x & \text{if } 1<x\le 4 \\ \sqrt{x} & \text{if } x>4 \end{cases}$$