NAME: .....

MATH 121 - CALCULUS I

PRACTICE TEST I

Problem 1. Find $\lim_{x\to 0} f(x)$ for the following functions:

(1) $f(x) = \dfrac{(4+x)^2 - 16}{x}$.

(2) $f(x) = \sqrt{x^3 + x^2}\sin\left(\dfrac{\pi}{x}\right)$.

(3) $f(x) = \begin{cases} 2x^3 + 3 & \text{if} \quad x > 0 \\ 3 & \text{if} \quad x = 0 \\ 3x^2 - 2 & \text{if} \quad x < 0. \end{cases}$

Problem 2. Find all asymptotes of the function $f(x) = \dfrac{x^2+1}{2x^2 - 3x - 2}$.

Problem 3. Find the equation for the tangent line of the curve $y = x^2 - 3x + 1$ at the point $P(1, -1)$.

Problem 4. Find derivatives of the following functions:

(1) $y = (x^3 + 2x)3^x$.

(2) $f(\theta) = \dfrac{1 - \sec\theta}{\tan\theta}$.

(3) $f(z) = \sqrt{\dfrac{z-1}{z+1}}$.

(4) $f(z) = \dfrac{(2x+1)^3\sqrt{x^2 - x + 1}}{e^x(x+3)^2}$.