NAME_____ID_____

MATHEMATICS 249     MIDTERM     Fall 2004

SHOW ALL WORK. Marks for each problem are to the left of the problem number.
NO CALCULATORS PLEASE.

[4] 1. Find $\lim\limits_{x\to\infty}\left(\dfrac{6-6x^2}{x^2-7x+6}\right)$.

[5] 2. Find $\lim\limits_{x\to-2}\left(\dfrac{x+2}{\sqrt{x+6}-2}\right)$.

[5] 3. Find $f'(x)$ where $f(x) = (2 - x^3)e^{2x+1}$.

[5] 4. Find $\dfrac{d}{dx}\left(\dfrac{5x^2 - 8}{5\sin 8x}\right)$.

[5] 5. Use implicit differentiation to find $\dfrac{dy}{dx}$ where $x^2 - 4y = \tan(xy)$.

[5] 6. USE THE DEFINITION OF DERIVATIVE to find $\dfrac{d}{dx}\left(\dfrac{1}{x+1}\right)$.

[6] 7. Find the equation of the tangent line to the curve $y = \dfrac{\sqrt{2x}}{1-x}$ at the point on the curve where $x = 2$.

$\overline{[35]}$

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SHOW ALL WORK. Marks for each problem are to the left of the problem number.
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[4] 1. Find $\lim\limits_{x \to -4} \left( \dfrac{2x^2 + 7x - 4}{8 + 2x} \right)$.

[5] 2. Find $\lim\limits_{x \to 1^+} \left( \dfrac{1}{x - 1} - \dfrac{1}{x^2 - 1} \right)$.

[5] 3. Find $f'(x)$ where $f(x) = xe^{\sin 4x}$.

[5] 4. Find $\dfrac{d}{dx}\left(\dfrac{\ln(3x-1)}{x^3 - 4x + 1}\right)$.

[5] 5. Use implicit differentiation to find $\dfrac{dy}{dx}$ where $x^2 \sec y = x + y^2$.

[5] 6. USE THE DEFINITION OF DERIVATIVE to find $\dfrac{d}{dx}\left(\sqrt{5x}\right)$.

[6] 7. The position of an object moving on the number line at time $t$ is given by the function $f(t) = \dfrac{t^{3/2}}{t - 6}$ . Find the velocity of the object at time $t = 4$.

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