NAME_____ID_____

<div align="center">MATHEMATICS 249   MIDTERM   November 7, 2003</div>

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

[5] 1. Find $\displaystyle\lim_{x \to -1}\left(\frac{\sqrt{1-3x}-2}{x+1}\right)$.

[4] 2. Find $\displaystyle\lim_{x \to 0^+}\left(\frac{\sin 5x}{x\sqrt{x}}\right)$.

[5] 3. Find $\dfrac{dy}{dx}$ where $y = x^3 \cos(1 - 4x)$.

[5] 4. Find $\dfrac{d}{dx}\left(\sqrt{4 - \sec(4/x)}\right)$.

[5] 5. Find $\dfrac{d}{dx}\left(\dfrac{e^{2x}}{x^2 + \ln(x^2)}\right).$

[5] 6. Use implicit differentiation to find $\dfrac{dy}{dx}$ where $x^{3/2} + y^{3/2} = xy + 3.$

[5] 7. USE THE DEFINITION OF DERIVATIVE to find $\dfrac{d}{dx}(3 - 2x)$.

[6] 8. Find the equation of the tangent line to the curve $y = \dfrac{x^3}{3x^2 - 5}$ at the point on the curve where $x = 1$.

$\overline{[40]}$