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## MATHEMATICS 249      MIDTERM      Fall 2000

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

[5] 1. Find $\displaystyle\lim_{x\to 1/2}\left(\frac{5-10x}{2x^2-7x+3}\right)$.

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

[5] 3. Find $\dfrac{d}{dx}\left(\dfrac{\tan 2x}{x+8}\right)$.

[5] 4. Find $\dfrac{d}{dx}\sqrt{\sin x - x \cos x}$.

[5] 5. Find $\dfrac{d}{dx}\left((7 - \sec^7 x)^{-7}\right)$.

[5] 6. USE THE DEFINITION OF DERIVATIVE to find $\dfrac{d}{dx}\sqrt{3 - 5x}$.

[5] 7. An object is moving on a straight line. Its position (distance from a fixed point) at any time $t$ is given by the function $f(t) = 2t^2 - 5t + 2$. Find the instantaneous velocity of the object at time $t = 3$. (Use any method.)

[5] 8. Suppose that $f(x)$ and $g(x)$ are differentiable functions. Use the definition of derivative to prove that $\quad \dfrac{d}{dx}(f(x) - g(x)) = \dfrac{d}{dx}f(x) - \dfrac{d}{dx}g(x).$

[40]