Math 222 Calc II TEST 1 (9/25/00) Name_____

Show complete work—that is, all the steps needed to completely justify your answer. Simplify your answers as much as possible. Show your work in the blue book. Hand in **both** this paper and the blue book.

(1) [5 points each] Evaluate the following:

(a) $f'(x)$ if $f(x) = e^{2^x}$.

(b) $\lim_{x\to 0} \dfrac{\sin^{-1}(2x)}{x}$.

(c) $\displaystyle\int_0^{1/2} \frac{dx}{\sqrt{1-x^2}}$.

(d) $\displaystyle\int \frac{x\,dx}{4+x^2}$.

(e) $\displaystyle\int \sin^3 x\,dx$.

(2) Let $f(x) = x^3 + 6x - 2$ and let $g = f^{-1}$.

(a) Find $g(-2)$.

(b) Find $g'(-2)$.

(c) Prove that f is one-to-one (so that we can be sure f^{-1} exists).

(3) Evaluate $\displaystyle\int \frac{5x+1}{(x-1)^2(x+2)}\,dx$.

(4) Find the area under the curve $y = (\ln x)^2$ between $x = 1$ and $x = e$.

(5) Evaluate $\displaystyle\int \frac{x^2}{(4+x^2)^{3/2}}\,dx$.

(6) For $f(x) = (\ln x)^{1/x}$:

(a) Find $f'(x)$.

(b) Find $\lim_{x\to\infty} f(x)$.

(7) Find $\displaystyle\int \frac{1}{x^2 - 6x + 13}\, dx.$