Test Total

Name _____

Exam 1 Calculus II Dr. Clemons

INSTRUCTIONS: Show your work!. Exam 1C

1. Evaluate and simplify the derivatives of the following functions of x:

   (a) [7 pts] $f(x) = e^{\ln(x^2+x)}$.

   (b) [7 pts] $g(x) = \sin^{-1} e^{(2x)}$.

   (c) [7 pts] $h(x) = \sec^{-1}(\cos x)$.

   (d) [7 pts] $j(x) = e^{2x}\sin(3x)$.

   (e) [7 pts] $k(x) = \log_5(\sqrt[3]{x^2})$.

2. Evaluate and simplify the following integrals:

   (a) [8 pts] $\int 5^{2x+3}\,dx$.

   (b) [8 pts] $\int \dfrac{dx}{x\ln x\sqrt{(\ln x)^2-1}}$.

   (c) [8 pts] $\int \dfrac{x+2}{x^2+4}\,dx$.

   (d) [8 pts] $\int \dfrac{\operatorname{sech}^2(1+\ln x)}{x}dx$.

   e) $\int \dfrac{\tan x}{\cos^3 x}\,dx$

   f) $\int \tan^{-1} x\,dx$

   g) $\int \dfrac{1}{\sqrt{-x^2-4x-3}}\,dx$

3. Use L'Hospital's Rule to evaluate:

   (a) [7 pts] $\lim\limits_{x\to 0+}(|\ln x|)^x =$.

   (b) [7 pts] $\lim\limits_{x\to 1^+}\dfrac{\ln x - x + 1}{x^3 - 3x + 2} =$.

4. Consider the function $f(x) = \sinh(2x) + 5e^{3x}$.

   (a) [7 pts] Show that $f(x)$ has an inverse function on its whole domain.

   (b) [6 pts] Find the slope of the tangent line to $y = f^{-1}(x)$ at the point $(5, 0)$.

5. [9 pts] Use logarithmic differentiation to find the derivative of

$$f(x) = (x^2+x)^5\frac{\sqrt[3]{2-3x}}{\sqrt[4]{x+1}}.$$