

Test Total

Name _____

Exam 1 Calculus II Dr. Clemons

INSTRUCTIONS: Show your work!

Exam 1B

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

- (a) [7 pts] $f(x) = x^{\sin x}$.
- (b) [7 pts] $g(x) = (3x^2 - x + 1)e^{5x}$.
- (c) [7 pts] $h(x) = \sin^{-1}(\sqrt{x})$.
- (d) [7 pts] $j(x) = e^{-5x} \cos(2x)$.
- (d) [7 pts] $k(x) = \log_2(x)$.

2. Evaluate and simplify the following integrals:

- (a) [8 pts] $\int \frac{dx}{x\sqrt{\ln x}}$ e) $\int (x+1) \ln x \, dx$
- (b) [8 pts] $\int_1^e \frac{dx}{x\sqrt{5-2\ln x}}$ f) $\int \sec x \tan^3 x \, dx$
- (c) [8 pts] $\int \frac{t+3}{4t^2+9} dt$ g) $\int e^{\cos x} \sin^3 x \, dx$
- (d) [8 pts] $\int e^{2t} \sinh(1 + e^{2t}) dt$.

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

- (a) [7 pts] $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{e^x - 1} \right) = .$
- (b) [7 pts] $\lim_{x \rightarrow 0^+} |\ln x|^x = .$

4. Consider the function $f(x) = 5x + \sin(2x)$.

- (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 $(\frac{5\pi}{2}, \frac{\pi}{2})$.

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

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