

This test consists of 4 pages, none of which is intentionally left blank. Take a few seconds right now to be sure you have all the pages. The point value of each question is to the left of the question number. Show all your work in the space provided. If you run out of room for an answer, continue working on the back of the page. Your answers must be justified by your work.

- (24) 1. First, do you know the derivatives of the basic functions? Show that you do by filling in the following chart:

$f(x)$	$f'(x)$
x^n	
e^x	
$\ln(x)$	
$\sin(x)$	
$\cos(x)$	
$\tan(x)$	
$\cot(x)$	
$\sec(x)$	
$\csc(x)$	
$\sin^{-1}(x)$	
$\tan^{-1}(x)$	
$\sec^{-1}(x)$	

- (6) 2. Find an equation of the tangent to the graph of $f(x) = x^3 + 2x - 5$ at the point $(-1, -8)$.

3. Find the derivative of each of the following functions

(5) (a) $f(x) = x \ln(x)$

(5) (b) $f(x) = \frac{x^2 + 2x + 3}{\sqrt{x^2 - 1}}$

(5) (c) $f(x) = e^{\sin(x)}$

(8) 4. If $\sin(x + y) = \sin(xy)$ defines y implicitly as a function of x , find y' .

(10) 5. If $f(x) = (4x + 3)^3(3x + 5)^4$, find and simplify (in factored form) the derivative of f .

(10) 6. Use a linear approximation to $f(x) = \sqrt[3]{1 + 3x}$ to find an approximate value for $\sqrt[3]{1.03}$.

(10) 7. Find an equation of the tangent to the curve $y = x^2 - 6x + 8$ that passes through $(-1, -21)$

- (7) 8. Suppose $h(x) = f(g(x))$, where $f(2) = 3$, $g(2) = 5$, $f'(2) = -2$, $g'(2) = 4$, $f'(5) = 11$, and $g'(3) = -2$. Find $h'(2)$.

- (10) 9. A balloon is 200ft off the ground and is rising vertically at a rate of 15 ft/sec. An automobile passes beneath it traveling along a straight road at the constant rate of 45m/h = 66ft/sec. How fast is the distance between them changing 1 second later?