

NAME _____

10-DIGIT PUID _____

RECITATION INSTRUCTOR _____

RECITATION TIME _____

Page 1	/16
Page 2	/32
Page 3	/28
Page 4	/24
TOTAL	/100

DIRECTIONS

- Write your name, 10-digit PUID, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3 and 4.
- The test has four (4) pages, including this one.
- Write your answers in the boxes provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses in the left hand margin.
- No books, notes or calculators may be used on this exam.

(16) 1. Find the derivative of the following functions. (It is not necessary to simplify).

(a) $y = e^{-5x} \cos(3x)$.

(b) $y = e^{e^x}$

(c) $y = \ln(1 + 2e^{3x})$.

(d) $f(x) = \sqrt[3]{9 + 8 \sin 2x}$

- (8) 2. Find $\frac{dy}{dx}$ by implicit differentiation, if $(\tan y)(\sin x) = xy$.

- (12) 3. Find the exact value of each expression.

(a) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

(b) $\sin(\sin^{-1} 0.7)$

(c) $\tan^{-1}\left(\tan \frac{4\pi}{3}\right)$

(d) $\cos^{-1}\left(-\frac{1}{2}\right)$

- (12) 4. Find the derivatives of the following functions. (It is not necessary to simplify).

(a) $y = \tan^{-1} \sqrt{x}$

(b) $f(x) = \sin^{-1}(x^2)$

(c) $y = (x + 1)^x$

- (8) 5. Find a formula for $f^{(n)}(x)$ if $f(x) = \frac{1}{x-1}$.

$$f^{(n)}(x) =$$

- (4) 6. Find an equation of the tangent line to the curve $y = \sinh x$ at the point $(0, 0)$.

- (6) 7. If $F(x) = f(g(x))$, $f'(1) = 5$, and $g(x) = e^{2x}$, find $F'(0)$.

$$F'(0) =$$

- (6) 8. Find the linearization $L(x)$ of the function $f(x) = (\sin x + \cos x)^3$ at $a = \frac{\pi}{2}$.

$$L(x) =$$

- (4) 9. Find the differential dy if $y = \sec(5x)$.

- (12) 10. Air is let out of a spherical balloon so that its surface area is decreasing at a rate of $2 \text{ cm}^2/\text{sec}$. Find the rate at which the radius of the balloon is decreasing when the radius is 20 cm.



- (12) 11. A lighthouse is located on a small island 3 km away from the nearest point P on a straight shoreline and its light makes four revolutions per minute. How fast is the beam of light moving along the shoreline when it is 1 km from P ?

