MA 1	165
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NAME	Page 1	/16
STUDENT ID	Page 2	/32
RECITATION INSTRUCTOR	Page 3	/26
	Page 4	/26
RECITATION TIME	TOTAL	/100

DIRECTIONS

- 1. Write your name, student ID number, 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.
- 2. The test has four (4) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. 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.
- 5. Credit for each problem is given in parentheses in the left hand margin.
- 6. 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) $F(x) = (x^3 + 4x)^7$

(c)
$$f(x) = \sin^{-1}(\ln x)$$

(d)
$$y = \sqrt{1 + \sin^2(3x)}$$

Name: ____

(8) 2. Find $\frac{dy}{dx}$ by implicit differention, if $xe^y = y - 1$.

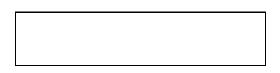
(9) 3. Find an equation of the tangent line to the ellipse $\frac{x^2}{9} + \frac{y^2}{36} = 1$ at the point $(-1, 4\sqrt{2})$.

(9) 4. Evaluate	each	expression:
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(a)
$$\cos^{-1}\left(\frac{1}{2}\right)$$

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

(6) 5. Find the derivative of $y = x^x$.



Name: _

(6) 6. Find the second derivative of $h(x) = \tan^{-1}(x^2)$.

(10) 7. The position of a particle is given by the equation $s = 5 \cos 2t$.

Find all values of t in the interval $[0, \pi]$ for which

(a) the velocity is 0.

(b) the acceleration is 0.

(10) 8. Gravel is being dumped from a conveyor belt at the rate of 30 ft³/min and its coarseness is such that it forms a pile in the shape of a cone whose base diameter and height are always equal. How fast is the height of the pile increasing when the pile is 10 ft high? $(V = \frac{1}{3}\pi r^2 h)$. Name: _

(12) 9. A snowball melts so that its surface area decreases at the rate of 2 cm²/min. How fast is the volume decreasing when the radius is 8 cm? $(V = \frac{4}{3}\pi r^3, S = 4\pi r^2)$.

(8) 10. Use a differential (or equivalently a linear approximation) to estimate $\sqrt{36.1}$.

(6) 11. Find the differential dy if (a) $y = \tan(3x)$

(b) $y = x \sec^2 x$