NAME _____

STUDENT ID _____

RECITATION INSTRUCTOR _____

RECITATION TIME _____

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DIRECTIONS

1. 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.
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, calculators or any electronic devices may be used on this exam.

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

(a) $y = x \cos \sqrt{x}$

(b) $f(t) = \sqrt[3]{1 + \ln t}$

(c) $y = \tan^2(3\theta)$

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

(6) 2. If $F(x) = f(x^2 + 3)$ and $f'(7) = -2$, find $F'(2)$.

(9) 3. Find an equation of the tangent line to the curve $x^3 - 3x^2y + y^2 = -1$ at the point $(1, 2)$.

(9) 4. Find the exact value of

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

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

(c) $\sin(2\sin^{-1}(\frac{3}{5}))$

(6) 5. Find the differential dy of each function:

(a) $y = x^3 \sin(5x)$

$dy =$

(b) $y = e^{\tan(\pi t)}$

$dy =$

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

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

(b) $F(x) = \sin^{-1}(e^{-x})$

(c) $y = (\tan x)^{1/x}$

(8) 7. Use a linear approximation to estimate $(16.8)^{3/4}$

(6) 8. If a ball is thrown vertically upward with a velocity of 80 ft/sec, then its height after t seconds is $s = 80t - 16t^2$. Find the maximum height reached by the ball.

(14) 9. A ladder 13 ft long rests against a vertical wall. If the top of the ladder slides down the wall at the rate of 3 ft/sec, how fast is the bottom of the ladder sliding away from the wall when the bottom of the ladder is 5 ft from the wall?

(14) 10. A street light is mounted at the top of a 12-ft-tall pole. A woman 5 ft tall walks away from the pole with a speed of 3 ft/sec along a straight and level path. How fast is the woman's shadow lengthening when she is 32 ft from the pole? (Let x be her distance from the pole and y be the length of her shadow).