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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.
- (12) 1. Find the following derivatives. It is not necessary to simplify.

(a)
$$f(t) = \frac{1}{(t^2 - 2t - 5)^4}$$

$$f'(t) =$$

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

$$F'(x) =$$

(c) $H(x) = \sqrt{1 + \cos(2x)}$

$$H'(x) =$$

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(8) 2. Find an equation for the tangent line to the graph of $y = \sin x + \cos 2x$ at $\left(\frac{\pi}{6}, 1\right)$.

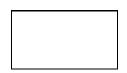
(9) 3. Find the value of each of the following inverse trigonometric functions.

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

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

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





(9) 4. Find $\frac{dy}{dx}$ by implicit differentiation if $\sqrt{xy} = 1 + x^2y$.



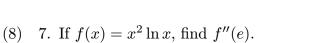
(6) 5. Find the second derivative of the function $H(t) = \tan 3t$.

$$H^{\prime\prime}(t) =$$

velocity =

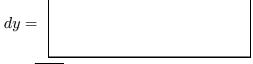
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(9) 6. The position of a particle at time t is given by $s = 2t^3 - 6t^2 + 4t + 1$. Find the velocity of the particle at the instant when the acceleration is zero.



f''(e) =

(5) 8. Find the differential of $y = \sin(e^x)$.



(8) 9. Use a linear approximation to estimate the number $\sqrt{36.1}$.

(8) 10. Find the derivative of $y = x^{\ln x}$. It is not necessary to simplify.

$$rac{dy}{dx} =$$

(9) 11. A plane flying horizontally at an altitude of 1 mi and a speed of 500 mi/h passes directly over a radar station. Find the rate at which the direct distance from the plane to the station is increasing when this distance is 2 mi.

(9) 12. A 13 ft. ladder is leaning against a vertical wall when its base starts to slide away. When the base is 12 ft. from the wall, it is moving at a rate of 5 ft/s. At what rate is the angle θ between the ladder and the ground changing at this time?

$$\frac{d\theta}{dt} =$$