

Name: _____

Practice Test 4 for Test 2 (151I,L)

1. Find the equation of the tangent line to the graph of $y = 1/x$ at the point $(4, 1/4)$. Use the limit definition of the derivative. (That is, don't use the rules from chapter 3.)

2. Find the derivative:

(a) $y = x^2 e^x$.

(b) $y = \sin(x^4)$.

(c) $y = e^x \cos(2x)$.

3. Find the derivative:

$$y = \cos^2(x^2).$$

4. Find the derivative:

$$y = \frac{xe^x}{x^2 + 1}.$$

5. Find the derivative:

$$y = x^{\frac{1}{x}}.$$

6. Find the derivative:

$$y = \sin^3(e^{2x}).$$

7. Find the derivative:

$$y = \arctan(e^{x^2}).$$

8. Find the equation of the tangent line to the given curve at the given point:

$$x^2 + 6xy + 7y^2 = -1; \quad (4, -1).$$

9. A spotlight shines on a wall that is 30 feet away. A 6-foot tall man walks directly away from the spotlight and toward the wall at a rate of 4 feet per second. At what rate is the top of his shadow moving down the wall at the instant he is 12 feet from the wall.

10. Gravel is dropped from a conveyor belt at a constant rate, to form a conical pile. The diameter of the base of the pile is always equal to the pile's height. If the height of the pile is increasing at the rate of a $\frac{1}{2}$ of a foot per minute at the instant the height of the pile is 6 feet, at what rate is the gravel being dropped on the pile?