

Name: \_\_\_\_\_

**Practice Test 1 for Test 2 (151I,L)**

1. Evaluate the derivative of  $f(x) = x^2$  from the definition.

2. Find the derivative of the given functions.

(a)  $f(x) = 2x^2 + 7x + 3\sqrt{x} + 1.$

(b)  $f(x) = \frac{x^3 + 1}{x + 2}.$

3. Find the derivative of the given functions.

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

(b)  $f(x) = \frac{\cos x}{(x + 2)^3}$ .

4. Find the equation for the tangent line to the curve  $x^2 + xy + y^2 = 7$  at the point  $(2, 1)$ .

5. Evaluate  $y'$ :

(a)  $y = \sin^2(\ln x)$ .

(b)  $y = \frac{\ln t}{t^2}$ .

(c)  $y = (\sin x)^x$ .

(d)  $y = \sqrt[3]{(x^3 + 1)(x + 1)^3}$ .

6. Find  $y'$ :

(a)  $y = x^2 \arctan x$ .

(b)  $y = e^x \sin(x^3)$ .

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

7. A 10-foot-long ladder leans against a vertical wall. The base of the ladder begins to slide away from the wall at the rate of 1.5 feet per second. How quickly is the top of the ladder sliding down the wall at the instant when the base of the ladder is 6 feet away from the wall?

8. Prove the following differentiation formula:

$$\frac{d}{dx} [\arctan x] = \frac{1}{1 + x^2}.$$

9. Find the maximum and minimum values of the function on the given interval:

$$f(x) = x^3 - x; \quad [-1, 1].$$