

Calculus I
Review for Test 2
Luczak

1. Find $f'(x)$ by the definition if $f(x) = 4x^2 - 3x + 5$
2. Is $f(x) = |x-4|$ continuous at $x = 4$? Is $f(x) = |x-4|$ differentiable at $x = 4$? Explain your answer.

3. For each of the following functions find the derivative.

a. $f(x) = \left(5 - e^{\frac{1}{x}}\right)^{\frac{3}{2}}$

b. $f(x) = \frac{(5x^2 + 3)^2}{x-1}$

d. $f(x) = (x+5)^2 \sqrt{x^2 + 1}$

e. $f(x) = \sin^{-1}(\cos x)$

f. $f(x) = \ln \frac{e^2}{5}$

g. $f(x) = x^2 \pi^x$

h. $f(x) = \sec^2 \frac{x^2}{3}$

i. $f(x) = (x+1)^{e^{2x}}$

j. $f(x) = \ln \frac{\sqrt{x^2 + 1}}{x(2x^3 - 1)^2}$

k. $f(x) = 10^{\csc 3x}$

l. $f(x) = \log_5(x^2 - 2x + 1)$

4. Find the equation of the line tangent to the graph of $f(x) = \frac{e^{2x} + 1}{x + 1}$ at $x = 0$.

5. Given $f(x) = \frac{1}{3}x^3 - 2x^2 - 5x + 3$

a. Find $f'(x) =$ _____

b. At what point (ordered pair) is the slope of the tangent line zero?

6. Find y' for $\ln(xy) - e^{-y} = 9$

7. Let the position function of a ball being thrown vertically upward be $s(t) = -16t^2 + 13t$.

a) Find the velocity when $t = 2$.

b) Find the acceleration when $t = 2$.

8. Prove one of the following:

a. $\frac{d}{dx}(\tan x) = \sec^2 x$

b. $\frac{d}{dx}(\csc x) = -\csc x \cot x$

c. $\frac{d}{dx}(\sec x) = \sec x \tan x$

d. $\frac{d}{dx}(\cot x) = -\csc^2 x$

9. Prove one of the following:

a. $\frac{d}{dx}(\sin^{-1} u) = \frac{u'}{\sqrt{1-u^2}}$

b. $\frac{d}{dx}(\tan^{-1} u) = \frac{u'}{1+u^2}$

c. $\frac{d}{dx}(\sec^{-1} u) = \frac{u'}{|u|\sqrt{u^2-1}}$

10. TRUE or FALSE: $\frac{d}{dx}(f(x)g(x)) = f'(x)g'(x)$. Explain your answer.

11. The area of a circle is decreasing at a rate of $2 \text{ cm}^2/\text{min}$. Find the rate of change of the radius with respect to time when the radius is 4 cm.