

Test II

October 7, 2002

Math 184H

Name _____

1. Differentiate. Do not simplify!

$$(a) \ y = 4x^5 - 5\sqrt[3]{x} + 2x - \frac{4}{x^2} + 8$$

$$(b) \ y = (3x^2 + \sqrt{x})(x^4 - x + 1)$$

$$(c) \ y = \frac{5x^4 - x - 1}{4x^2 + 3}$$

$$(d) \ y = 4(5x^4 - 7x^2 + 5x)^8$$

$$(e) \ y = -2(5 \ln x + \cos x)^5$$

(f) $y = \ln(4x^3 - 5x^2 + 9)^2$

(g) $y = x^3 \cdot \sqrt{\csc(x^2)}$

(h) $y = e^{(\sqrt[3]{x}+x-2)}$

(i) $y = \sin^3(2x) \tan^5(4x - 1)$

(j) $y = e^{x^3} \ln(2x^3 + x - 1)$

2. Write an equation of the line tangent to the curve $f(x) = 4x^2 - 3x + 1$ at $x = -2$.

3. Differentiate and simplify.

(a) $y = (3x^3 + 1)^6(4x^3 + 7x - 1)^8$

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

4. Use the limit-definition of derivatives, $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$, to find $f'(x)$.

$$f(x) = -2x^2 + 3x + 1$$

5. Use implicit differentiation to find $\frac{dy}{dx}$.

(a) $x^2y^3 - 2(x^2 + 5y)^4 + 3x = \ln y$

(b) $4\sqrt{y} - \sec^2\left(\frac{x}{y}\right) + 3 = 0$

6. A spotlight on the ground shines on a wall 12 meters away. If a man 2 m tall walks from the spotlight toward the building at a speed of 1.6 m/s, how fast is the length of his shadow on the building decreasing when he is 4 m from the building?