

REVIEW PROBLEMS - SOLUTIONS

READ THIS NOTE: I will be using parenthesis "(, ")" and brackets "[,]" interchangeably (when there are too many parenthesis involved, I will put brackets to clear the situation a bit out, so you can see where one begins and where one ends an expression).

Also, I will be using exclusively the notation y' , $f'(x)$, $h'(z)$ etc for the derivative. This doesn't, certainly, mean that notations such as $\frac{dy}{dx}$, $\frac{df}{dx}$ etc are not used, or invalid. If you prefer using the latter notation, kindly replace, without any penalty, accordingly: y' with $\frac{dy}{dx}$, $f'(x)$ with $\frac{df}{dx}$, etc.

Any comments or corrections regarding these solutions should be immediatly directed to me:

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Good luck!

- (1) Find the derivatives of the following functions (Do not simplify)

(a)

$$f(x) = (2 + 15x - 7x^2)(x^9 - 8x + 4)$$

(b)

$$f(t) = \frac{t^3 + 7t + 5}{t^5 - 9t^2 + 3}$$

(c)

$$y = (8x + 5)^{\frac{4}{7}} + e^{\frac{4}{7}}$$

(d)

$$f(x) = \ln[(7x+1)^6] + [\ln(7x+1)]^6$$

(e)

$$y = 3^{5t} - \log_3(5t)$$

(f)

$$y = e^{9x^5} - 2\sqrt{x}$$

(g)

$$f(x) = x^{7\ln(5)}$$

(h)

$$f(x) = \frac{4 + (2x-3)^{11}}{4 - (2x-3)^{11}}$$

(i)

$$f(x) = \ln[(3x^9+1)^7 \cdot (5x-1)^8]$$

(j)

$$y = \sqrt[7]{\frac{9}{x^6 - 6x + 15}}$$

- (2) Use implicit differentiation to express $\frac{dy}{dx}$ in terms of x and y from

$$9x^6 + 8x^3y^2 - y^9 = 95.$$

- (3) Use Chain Rule to find $\frac{dy}{dx}$ where

$$y = u^8 + 3u^6 - 4$$

and

$$u = x^5 - 5x + 16.$$

- (4) Find the equation of the tangent line to the graph of

$$y = x^3 - 7x + 6$$

at the point $(1, 0)$.

- (5) Find the rate of change of $f(x) = 9x^6 - 8x^3 + 11$ with respect to x and evaluate it when $x = 1$.

- (6) If a manufacturer's average cost function is given by

$$\overline{C} = .005q^2 - .5q + 70 + \frac{300}{q},$$

find the marginal cost function. What is the marginal cost when 50 units are produced.