

Name : _____

Medgar Evers College – Mathematics

Calculus 1

MTH 202, Section 001, Fall 2017

Instructor: Bart Van Steirteghem

Written assignment 2. Due Wednesday November 22, 2017 at the start of class.

This assignment is meant to give you practice with writing out the mathematical argument you use when you are solving a problem.

Answer the following questions **neatly** on lined sheets, and staple them behind this sheet. To get full credit, your written work must *explain* why the solution you obtain is correct.

Problems

1. Find the derivative y' of the following functions y . Show your work, and at every step indicate which differentiation rule or rules you have used.

[The first derivative is computed below as an example.]

(a) $y = x^{100} + x^{50} + x^{10}$

(b) $y = \frac{1}{6}x^6 + \frac{1}{5}x^5 + \frac{1}{4}x^4$

(c) $y = -2x^2 \ln(x)$

(d) $y = \sqrt{x^4 - 3x}$

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

(7)

(7)

(7)

(7)

Solution: (a)

$$y = x^{100} + x^{50} + x^{10}$$

$$\begin{aligned} y' &= (x^{100} + x^{50} + x^{10})' \\ &= (x^{100})' + (x^{50})' + (x^{10})' \\ &= 100x^{99} + 50x^{49} + 10x^9 \end{aligned}$$

[by the sums rule]

[by the power rule]

Answer: $y' = 100x^{99} + 50x^{49} + 10x^9$.

2. (You do not need to copy this problem. You can just fill in the blanks) On each line (_____) write the name of the differentiation rule that justifies that step of the calculation. (10)

$$f(x) = x^3 + (x^2 + 3)^4 + \sqrt{8}$$

$$f'(x) = (x^3 + (x^2 + 3)^4 + \sqrt{8})'$$

$$= (x^3)' + ((x^2 + 3)^4)' + (\sqrt{8})' \quad \text{by the _____}$$

$$= (x^3)' + ((x^2 + 3)^4)' + 0 \quad \text{by the constant rule}$$

$$= (x^3)' + 4(x^2 + 3)^3(x^2 + 3)' \quad \text{by the _____}$$

$$= (x^3)' + 4(x^2 + 3)^3[(x^2)' + (3)'] \quad \text{by the _____}$$

$$= (x^3)' + 4(x^2 + 3)^3(x^2)' \quad \text{by the _____}$$

$$= 3x^2 + 4(x^2 + 3)^3 2x \quad \text{by the _____}$$

$$= 3x^2 + 8x(x^2 + 3)^3$$

3. Neatly copy the solution to the next question and correctly fill in the blanks according to the context. You must copy the entire solution to receive credit. Answers that just list responses will not be graded. Highlight each response you entered in a blank space using a highlighter. (12)

Find the equation of the tangent line to the graph of the function $y = x^2 - 5$ at the point with x -coordinate 2.

Solution:

The point on the graph of $y = x^2 - 5$ with x -coordinate 2 is (____, ____). The _____ of the tangent line at $x = 2$ is $y'(2)$. We first compute $y' = \underline{\hspace{2cm}}$ and then $y'(2) = \underline{\hspace{2cm}}$. So, the desired tangent line is the line through the point (____, ____) and with slope _____. Therefore, the point-slope formula tells us that its equation is $y - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}(x - \underline{\hspace{1cm}})$, or, in slope-intercept form, $y = \underline{\hspace{2cm}}$.

4. Problem 5 on the Practice Midterm Exam¹ (10)

5. Problem 8 on the Practice Midterm Exam (10)

¹available from <http://bvans.net/mth202>