

MATH FOR BUSINESS: CALCULUS, SPRING 2017 - PROBLEM SET 9

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. Find the limits of the following:

$$(1) \lim_{x \rightarrow 4^+} \frac{x+2}{x+3}$$

$$(2) \lim_{x \rightarrow 4^-} \frac{3x}{x-4}$$

$$(3) \lim_{x \rightarrow 3^+} \ln(x^2 - 9)$$

$$(4) \lim_{b \rightarrow \infty} \sqrt[3]{b}(b-2)$$

$$(5) \lim_{x \rightarrow -\infty} (x^4 + x^5)$$

Problem 2. Find the horizontal asymptotes, if any, of the following:

$$(a) y = \frac{1}{e^x + 1}$$

$$(b) y = \frac{4x^2}{3x^2 - 2}$$

Problem 3. Evaluate:

$$\lim_{x \rightarrow \infty} \frac{x+3}{\sqrt{4x^2 + 1}}$$

Problem 4. Find the horizontal derivative of

$$y = \frac{x}{\sqrt{x^2 + 1}}$$

Problem 5. Find the dimensions of a rectangle with perimeter $100m$ such that the area is maximized.

Problem 6. Find the dimensions of a rectangle with area $1000cm^3$ such that the perimeter is as small as possible.

Problem 7. Find the local maximum and minimum values of $f(x)$ using both the First Derivative test and the Second Derivative test. Which method do you prefer?

$$(a) f(x) = x^5 - 5x + 3$$

$$(b) f(x) = \frac{x}{x^2 + 4}$$

Problem 8. Bonus.

Determine the largest rectangle that can be inscribed within a circle of radius 4. The diagram below should give some hint as how to approach this question.

