

MAC 2311 Calculus—Analytic Geometry

Homework #3

Please hand in your solutions by Apr 19, 2007 (7 p.m.).

Problem 0: Identification (1P)

Write your name on each sheet of paper you are using.

Problem 1: Graphing a function (9P)

Consider the function f given by

$$f(x) := \left| x + \frac{1}{x} \right| .$$

- Determine the domain of f , i. e., find out for which x -values the function f is defined.
- Show that the graph of f is symmetric with respect to the y -axis.
- Determine all asymptotes of f (horizontal, vertical, slant).
- Determine all local minima and maxima of f .
- Determine where f is increasing or decreasing.
- Determine where f is concave upward or downward.
- Sketch the graph of f .

Problem 2: Limits**(4 P)**

Determine if the following limits exist. If not, explain why. If yes, compute the respective value.

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$$\lim_{x \rightarrow 1} \frac{x^a - 1}{x^b - 1} \quad (a, b \in \mathbb{R})$$

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$$\lim_{x \rightarrow 1} \frac{3^x - 3}{x - 1}$$

Problem 3: Integration**(6 P)**

• Find

$$\int \frac{2x^2 - 3}{x - 4} dx \quad .$$

• Evaluate

$$\int_0^2 \left(\frac{x}{e}\right)^2 \sqrt{\frac{x^3 + 8}{3}} dx \quad .$$