

MATH 108
FALL 2013
MIDTERM 1 REVIEW

Here are some more problems to help you practice for the first midterm, some of them easy, some of them hard. None of this is to be turned in.

Problems from §2.5: 48, 49, 50, 53

Problems from §2.6: 3, 7, 13, 19, 25, 35, 37, 43, 49

Problem 1. Let f be a function with domain A and range B .

- (a) Define “ f is increasing.”
- (b) Define “ f is one-to-one.”
- (c) Prove that if f is increasing, then f is one-to-one.
- (d) Suppose that f is increasing. By part (c), f is one-to-one, and therefore f has an inverse f^{-1} . Prove that f^{-1} is increasing.

Problem 2. For $x \neq 0$, let

$$F(x) = \frac{|x|}{x}.$$

- (a) Sketch the graph of F .
- (b) Give a rigorous proof, using the definition of limit, that $\lim_{x \rightarrow 0} F(x)$ does not exist.

Problem 3. Let

$$h(t) = \begin{cases} e^{-1/t^2} \cos(1/t^2), & t \neq 0 \\ 0, & t = 0. \end{cases}$$

At which points $a \in \mathbb{R}$ is h continuous?

Problem 4. Explain why the range of \sin^{-1} is $[-\pi/2, \pi/2]$.