

Math 134: Homework 8

Due November 18

1. Let $f : (a, b) \rightarrow \mathbf{R}$ be an increasing function. Show that f^{-1} is increasing on the range of f .

Note: *The function f is not necessarily continuous.*

2. Assume that f is continuous and one-to-one on (a, b) . Show that f is increasing on the whole interval, or that f is decreasing on the whole interval.

3. For $x > 1$ let

$$K(x) = \int_e^x \frac{dt}{\ln(t)}.$$

Show that if a and b are positive constants, then the following two equalities hold:

$$\int_e^x \frac{dt}{\ln(t+a)} = K(x+a) - K(e+a), \quad (\text{i})$$

$$\int_e^x \frac{dt}{b + \ln(t)} = e^{-b} \{K(e^b x) - K(e^b e)\}. \quad (\text{ii})$$