Real Analysis 1, MATH 5210, Fall 2025

Homework 1, Section 6.6. Convex Functions

Due Saturday, January 25, at 11:59 p.m.

Write in complete sentences and paragraphs!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook or hypotheses. Use the notation and techniques described in the in-class hints. Do not discuss homework problems with others. If you have any questions, then contact me (`gardnerr@etsu.edu`).

6.64. Let φ have a second derivative at each point in (a, b). Prove that φ is convex if and only if φ'' is nonnegative.

6.68. Let f be integrable over $[0, 1]$. Prove that

$$\exp\left(\int_{[0,1]} f\right) \leq \int_{[0,1]} \exp(f).$$

HINT: You do not know that $\exp(f)$ is integrable on $[0, 1]$.