Homework 2
MATH 166 - Fall 2024
Tufts University, Department of Mathematics
Instructor: James M. Murphy
Due: September 19, 2024

1. Book Questions

Wasserman: Chapter 5: #3, #4, #14; Chapter 6: #1

2. Supplemental Question (Convergence in L^p, $p \neq 2$)

For $p > 1$, we say a sequence $\{X_n\}_{n=1}^{\infty}$ of r.v. converges to a r.v. X in L^p if

$$\lim_{n\to\infty} \mathbb{E}|X - X_n|^p = 0.$$

Show that if $\{X_n\}_{n=1}^{\infty}$ converges to X in L^2, then $\{X_n\}_{n=1}^{\infty}$ converges to X in L^1. We sometimes call the former *convergence in mean square* and the latter *convergence in mean*.