15-259/559: Probability and Computing **Homework 6**
Due Friday 10/03/2025 at 12:50PM

Show all your work. Work through the problems carefully and **do not use online references, mathematical solvers, or GenAI** as a shortcut for finding the solutions. You will regret it in the quizzes and examinations.

Part I

Exercises 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12 in the textbook.

Part II

[**Expected win probability**] Arisha and Justin play successive matches of chess. Assume that Arisha wins each match with probability P, independently of her results on other matches. We don't know P, so we assume $P \sim \text{Uniform}(0, 1)$. We are told that so far Arisha has won 2 games and lost 1 game. We are not given the specific ordering of wins/losses. Derive

$$\mathbf{E}\left[P \mid \text{current score is 2 to 1}\right].$$