Homework 9

April 16th
Due April 23rd

Your assignment may be handwritten or typeset, but in any case it should be neat and readable. Your name, class number and assignment number should be clearly visible (like on this document for example).

You are encouraged to work in groups for this assignment. However, the redaction should be done on one's own: do not copy some other student's work, or give your assignment to some other student. To consult textbooks or online resources is fair game; on the other hand, to look up the exact exercise and its solution is not.

Exercises from the book

Exercise 2.31 is included in this homework.

Exercise 1

Let $X \sim \mathcal{U}nif(0, 1)$. What is the probability $\mathbb{P}((2X - 1)^2 \geq 1/4)$?
    Hint: What are the possible values of x such that $(2x - 1)^2 \geq 1/4$?

Exercise 2

Let X be a random variable with probability density function

$$p_X(x) = \frac{C}{1 + x^2}$$

for some constant C ($C = 1/\pi$, but you can simply use C if you'd rather), and $Y = 2X$.

1. What is the cumulative distribution function of X?

2. What is the cumulative distribution function of Y?

3. It turns out that Y is a continuous random variable. What is its probability density function?