

Homework 15

Math 262

Write your solutions to the following problems and turn them in to the homework mailbox (RMS level 3, near the fireplace) by 5:00pm on **Monday, May 15**.

Book Problems

- Section 4.5 #85, 86, 91, 95, 99 (pages 364–367)
- Section 4.6 #103, 104, 105 (page 373)

Additional Problems

1. Explain in your own words the difference between the Central Limit Theorem and the Law of Large Numbers.
2. The total time X_1 from arrival to completion of service at a fast-food restaurant and the time X_2 spent waiting in line before arriving at the service window have a joint density function given by

$$f(x_1, x_2) = \begin{cases} e^{-x_1} & \text{if } 0 \leq x_2 \leq x_1 \leq \infty, \\ 0 & \text{otherwise.} \end{cases}$$

$Y = X_1 - X_2$ represents the time spent at the service window.

- (a) Find the pdf of Y .
 - (b) Find $E(Y)$.
3. X_1 and X_2 have joint density given by

$$f(x_1, x_2) = \begin{cases} x_1 + x_2 & \text{if } 0 \leq x_1 \leq 1 \text{ and } 0 \leq x_2 \leq 1, \\ 0 & \text{otherwise.} \end{cases}$$

Let $Y = \frac{X_1}{X_2}$. What is the density of Y ?

Extra Credit Problem

Two 2-digit numbers are formed by randomly selecting four digits, without replacement, from the digits 1, 2, ..., 9. (That is, each 2-digit number contains no repeated digits, the two numbers contain no digits in common, and all such pairs of numbers are equally likely.) What is the expected value of the product of the two numbers?