ECE 302: Probabilistic Methods in Electrical and Computer Engineering
Fall 2021
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PURDUE
UNIVERSITY

Homework 9

Fall 2019
(Solve on your own before Exam 2)

Homework is NOT due EVER.

Joint PDF and CDF and PMF, Marginal PDF and CDF and PMF (Ch 5.1-5.4); Independence (Ch 5.5)

Exercise 1. (Edited from textbook, problems 5.8)
For the random variables (X, Y), sketch the region of the plane corresponding to the following events. Indicate if the event is of "product form" (see page 236 of textbook), which means that it is the intersection of two one-dimensional events.
(Recall, two RVs cannot be independent if their Region of Support is **NOT** in product form.)

(a) $\{X + Y > 3\}$

(x) $\{a < X \le b\} \cap \{Y > d\}$.

(c) $\{\min(X, Y) > 0\} \cup \{\max(X, Y) < 0\}$

(d) $\{|X - Y| \ge 1\}$

(h) $\{XY < 0\}$

Exercise 2. (FROM TEXTBOOK, PART OF PROBLEM 5.93)
Two teams play soccer, the Bulldogs and the Flames. The number of goals the Bulldogs score against the Flames, X, has a geometric distribution with mean 2. The number of goals the Flames score, Y, against the Bulldogs is geometrically distributed with a mean of 4. Assume X and Y are independent.

(b) What is the probability the two teams have the same score at the end of the game?

(Note about this problem: Even though this problem comes from the textbook related to section 5.8, you now have sufficient knowledge to solve part (b) of the problem. We have yet to cover the necessary material for Part (a), which is to first find the pmf of $Z = X - Y$. That approach is not necessary to solve part (b).)