

HW 11 — Due: November 22, 5 PM

Lecturer: Prapun Suksompong, Ph.D.

Instructions

- (a) This assignment has 3 pages.
- (b) (1 pt) Write your first name and the last three digit of your student ID on the upper-right corner of *every* submitted sheet.
- (c) (1 pt) For each part, write your explanation/derivation and answer in the space provided.
- (d) (8 pt) It is important that you try to solve all non-optional problems.
- (e) Late submission will be heavily penalized.

Problem 1 (Yates and Goodman, 2005, Q3.2.1). The random variable X has probability density function

$$f_X(x) = \begin{cases} cx & 0 \leq x \leq 2, \\ 0, & \text{otherwise.} \end{cases}$$

Use the pdf to find the following quantities.

- (a) the constant c

- (b) $P[0 \leq X \leq 1]$

(c) $P[-1/2 \leq X \leq 1/2]$.

(d) the cdf $F_X(x)$.

Problem 2 (Modified from Yates and Goodman, 2005, Q3.1.3). The CDF of a random variable W is

$$F_W(w) = \begin{cases} 0, & w < -5, \\ (w + 5)/8, & -5 \leq w < -3, \\ 1/4, & -3 \leq w < 3, \\ 1/4 + 3(w - 3)/8, & 3 \leq w < 5, \\ 1, & w \geq 5. \end{cases}$$

(a) Is W a continuous random variable?

(b) What is $P[W \leq 4]$?

(c) What is $P[-2 < W \leq 2]$?

(d) What is $P[W > 0]$?

(e) What is the value of a such that $P[W \leq a] = 1/2$?

Problem 3 (Yates and Goodman, 2005, Q3.2.3). The CDF of random variable W is

$$F_W(w) = \begin{cases} 0, & w < -5, \\ (w + 5)/8, & -5 \leq w < -3, \\ 1/4, & -3 \leq w < 3, \\ 1/4 + 3(w - 3)/8, & 3 \leq w < 5, \\ 1, & w \geq 5. \end{cases}$$

Find its pdf $f_W(w)$.

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