

HW 8 — Due: November 1, 5 PM

Lecturer: Prapun Suksompong, Ph.D.

Instructions

- (a) This assignment has 4 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 page.
- (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 problems.
- (e) Late submission will be heavily penalized.

Problem 1. Suppose X is a random variable whose pmf at $x = 0, 1, 2, 3, 4$ is given by $p_X(x) = \frac{2x+1}{25}$.

Remark: Note that the statement above does not specify the value of the $p_X(x)$ at the value of x that is not 0,1,2,3, or 4.

- (a) What is $p_X(5)$?

- (b) Determine the following probabilities:
 - (i) $P[X = 4]$

 - (ii) $P[X \leq 1]$

(iii) $P[2 \leq X < 4]$

(iv) $P[X > -10]$

Problem 2. The random variable V has pmf

$$p_V(v) = \begin{cases} cv^2, & v = 1, 2, 3, 4, \\ 0, & \text{otherwise.} \end{cases}$$

(a) Find the value of the constant c .

(b) Find $P[V \in \{u^2 : u = 1, 2, 3, \dots\}]$.

(c) Find the probability that V is an even number.

(d) Find $P[V > 2]$.

(e) Sketch $p_V(v)$.

(f) Sketch $F_V(v)$. (Note that $F_V(v) = P[V \leq v]$.)

Problem 3. The thickness of the wood paneling (in inches) that a customer orders is a random variable with the following cdf:

$$F_X(x) = \begin{cases} 0, & x < \frac{1}{8} \\ 0.2, & \frac{1}{8} \leq x < \frac{1}{4} \\ 0.9, & \frac{1}{4} \leq x < \frac{3}{8} \\ 1 & x \geq \frac{3}{8} \end{cases}$$

Determine the following probabilities:

(a) $P[X \leq 1/18]$

(b) $P[X \leq 1/4]$

(c) $P[X \leq 5/16]$

(d) $P[X > 1/4]$

(e) $P[X \leq 1/2]$

[Montgomery and Runger, 2010, Q3-42]

Don't forget to write your first name and the last three digit of your student ID on the upper-right corner of each submitted sheet.