

Homework 8, ISyE 2027 Spring 2006

Due Wednesday, March 29

Problem 1 Hayter, Problem 2.5.6.

Problem 2 Hayter, Problem 2.5.8

Problem 3 Suppose that X and Y are continuous random variables with joint pdf

$$f_{X,Y}(x,y) = \begin{cases} 1, & 0 < x < 1, 0 < y < 1; \\ 0, & \text{otherwise.} \end{cases}$$

- (a) Compute the marginal pdf's of X and Y .
- (b) Are X and Y independent?
- (c) Compute $P(X + Y \leq t)$, in other words, find the cumulative distribution function of $X + Y$.
- (d) Compute $P(XY \leq t)$.
- (e) Compute $E[X^2Y]$.

Problem 4 If the joint probability mass function of X and Y is given by

$$p_{X,Y}(x,y) = \begin{cases} \frac{x+y}{30}, & x \in \{0, 1, 2, 3\}, y \in \{0, 1, 2\}; \\ 0, & \text{otherwise.} \end{cases}$$

find

- (a) $P(X \leq 2, Y = 1)$
- (b) $P(X > 2, Y \leq 1)$
- (c) $P(X > Y)$
- (d) $P(X + Y = 4)$
- (e) Compute the conditional pmf of Y , given that $X = 0$.
- (f) Compute the conditional pmf of X , given that $Y = 2$.
- (g) Compute the covariance of X and Y

Problem 5 Two people agree to meet after work but they are impatient and each will only wait 15 minutes for the other person to show up. Suppose that they each arrive at independent random times uniformly distributed between 5pm and 6pm. What is the probability they will meet?