

CSE 312: Foundations of Computing II

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Lecture Topics: 5.1 Joint Discrete Distributions

[Tags: Joint PMFs, Marginal PMFs, Expectation]

1. Suppose we flip a fair coin three times independently. Let X be the number of heads in the first two flips, and Y be the number of heads in the last two flips (there is overlap).
 - a. What distribution do X and Y have marginally, and what are their ranges?
 - b. What is $p_{X,Y}(x, y)$? Hint: Fill in the margins first representing the marginal distributions!
 - c. What is $\Omega_{X,Y}$?
 - d. Write a formula for $E[\cos(XY)]$.
 - e. Are X and Y independent?

a.

b.

$X \backslash Y$				Σ
Σ				

c.

d.

e.

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2. Let X be the roll of a fair 3-sided die. We then flip a fair coin X times independently; let Y be the number of heads.
- What are Ω_X and Ω_Y ? What is $\Omega_{X,Y}$? What is X 's marginal distribution?
 - What is $p_{X,Y}(x, y)$? Hint: Fill in the margins for X !
 - What is $p_Y(y)$?
 - Write a formula for $E\left[\frac{X}{Y^2+1}\right]$.
 - Are X and Y independent?

a.

b.

$X \setminus Y$					Σ
Σ					

c.

d.

e.