CS 206 - Introduction to Discrete Structures II

November 30, 2016

Homework: 8	Instructor: Morteza Monemizadeh
Due Date: Wednesday, December 7 (1:20 pm)	TA: Hareesh Ravi

Assignment 1:

For two independent roll of a fair die, let X denote the value rolled the first time and Y denote the value rolled the second time.

1. Find $Cov(X, Y)$, $Var[X]$, and $Var[Y]$.
2. Find $Cov(X + Y, X - Y)$.
3. Are the two random variables $X + Y$ and $X - Y$ independent? Why?

Assignment 2:

Suppose that two random variables X and Y have the following joint probability mass function.

$$Pr[X = 1 \wedge Y = 1] = Pr[X = 1 \wedge Y = 2] = 0.25$$
$$Pr[X = 2 \wedge Y = 2] = Pr[X = 2 \wedge Y = 3] = 0.25$$
$$Pr[X = 1 \wedge Y = 3] = Pr[X = 2 \wedge Y = 1] = 0$$

1. Find the marginal probability mass functions (pmf) of X and Y.
2. Find the expectations of X and Y, i.e., $Ex[X]$ and $Ex[Y]$.
3. Find $Cov(X, Y)$.

Assignment 3:

Let X be a random variable with the following mass distribution.

$$Pr[X = 0] = 0.3$$
$$Pr[X = 1] = 0.5$$
$$Pr[X = 2] = 0.2$$

Find the moment generating function for X.

Assignment 4:

Let X be a random variable with the following density distribution.

$$f(x) = x \quad \text{if } 0 < x < 1$$
$$f(x) = 0 \quad \text{otherwise}$$

Find the moment generating function for X.