

W10 Homework A

Due date: Thursday 3/19, 11:59pm

01

✍ Covariance and correlation

The joint PMF of X and Y is given by the table:

$Y \downarrow X \rightarrow$	0	1	2	3
1	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{2}{15}$	$\frac{1}{15}$
2	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{10}$
3	$\frac{1}{30}$	$\frac{1}{30}$	0	$\frac{1}{10}$

Compute:

- (a) $E[X + Y]$ (b) $E[(X - Y)^2]$ (c) $\text{Cov}[X, Y]$ (d) $\rho[X, Y]$

✍ Covariance etc. from independent densities

Suppose X and Y are independent variables with the following densities:

$$f_X(x) = \begin{cases} \frac{1}{3}e^{-x/3} & x > 0 \\ 0 & \text{otherwise} \end{cases} \quad f_Y(y) = \begin{cases} \frac{1}{8}e^{-y/8} & y > 0 \\ 0 & \text{otherwise} \end{cases}$$

Compute:

- (a) $P[X > Y]$ (b) $E[XY]$ (c) $\text{Cov}[X, Y]$ (d) $\rho[X, Y]$

✍ Plumber completion time

A plumber is coming to fix the sink. He will arrive between 2:00 and 4:00 with uniform distribution in that range.

Sink fixes take an average of 45 minutes with completion times following an exponential distribution.

When do you expect the plumber to finish the job?

What is the variance for the finish time?