

HW #6

Please, write clearly and justify all your steps, to get proper credit for your work.

(1)[6 Pts] Let X and Y have the following joint p.d.f. Compute μ_X , μ_Y , σ_X , σ_Y and ρ in each case: (a)

	x	
y	1	2
1	0.5	0
2	0	0.5

(b)

	x	
y	1	2
1	0.25	0.25
2	0.25	0.25

(c)

	x	
y	1	2
1	0.1	0.4
2	0.4	0.1

(2)[6 Pts] Let X and Y have the following joint p.d.f.

	x		
y	1	2	3
1	0.05	0.15	0.15
2	0.10	0.10	0.10
3	0.15	0.15	0.05

(a) Calculate the marginal densities. Are X and Y are independent?

(b) Compute the means and variances.

(c) Are X and Y positively correlated? negatively correlated? uncorrelated?

(3)[4 Pts] Let $W = 1 - X + 2Y$ be a discrete random variable where X , Y are independent discrete random variables with $\mu_X = 5$, $\mu_Y = 2$, and $\sigma_Y^2 = 2$, $\sigma_X^2 = 1$. Compute μ_W and σ_W^2 .

(4)[6 Pts] Let X, Y be discrete random variables, where $X = 1, 2, 3, 4$, $Y = 1, 2, 3$, with the joint distribution given by the matrix defined in R below

```
p <- matrix(c(.02, .04, .01, .06, .15, .15, .02, .20, .14, .10, .10, .01), ncol=4)
```

Use R to:

- (a) Verify that p is a probability mass function (i.e., check that it sums up to 1)
- (a) Define the marginal densities (hint: you can use the `apply` function) and plot them.
- (b) Compute the means and variances.
- (c) Are X and Y positively correlated? negatively correlated? uncorrelated?