

# Probability and Statistics I

## 23a. Statistics and their Distributions

## Chapter 5 Summary Exercise B

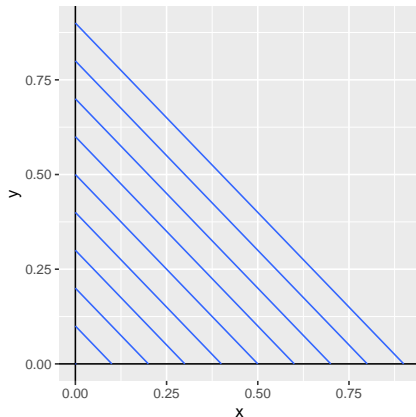
### Example 23a.1

Suppose that  $X$  and  $Y$  are random variables with joint pdf:

$$f(x, y) = c(1 - (x + y)), \quad 0 < x < 1, 0 < y < 1, x + y < 1.$$

## Example 23a.1 ctd

The contours of the pdf look like this:



### Example 23a.1 ctd

- a) Find the value of  $c$ .
- b) Find the marginal pdf of  $X$  and  $Y$ .
- c) Find the conditional pdf of  $X|Y = y$ .
- d) Find the conditional mean and variance of  $X|Y = y$ .
- e) It can be shown that

$$E(X) = E(Y) = 1/4$$

and

$$V(X) = V(Y) = 3/80.$$

What are the covariance and correlation of  $X$  and  $Y$ ?