

1. Consider the density function

$$f(x, y) = \begin{cases} 8xy & \text{for } 0 \leq y \leq x \leq 1. \\ 0 & \text{otherwise.} \end{cases}$$

Compute the following:

- a) $f_1(x)$
 - b) $f_2(y)$
 - c) $E(X)$
 - d) $V(X)$
 - e) $E(Y)$
 - f) $V(Y)$
 - g) $E(XY)$
 - h) $\text{Cov}(X, Y)$
 - i) ρ
 - j) $E(Y|X)$
 - k) $E(Y^2|X)$
 - l) $V(Y|X)$
 - m) $E(X + Y)$
 - n) $V(X + Y)$.
 - o) Are X and Y independent? Give a reason.
2. There are four types of hot pepper in a store, of roughly equal size. Someone fills a bag with a selection from the shelf. Each pepper has a different degree of hotness, measured as a multiple of a standard amount. Suppose the percentages in the bag and the hotness ratings of the various types are given as follows:

Pepper type	percentage in the bag	hotness rating
A	45%	4
B	35%	2
C	15%	3
D	5%	1

Pick 6 peppers at random from the bag, and assume there are enough peppers in the bag that the selection may be assumed to have been made with replacement.

- a) What is the probability you get two each of types A and B and one each of types C and D?
- b) What are the expected value and variance for the sum of the hotness ratings of the peppers picked?