

1. Consider the density function

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

- a) What is the marginal density function $f_1(x)$?
- b) What are $E(X)$ and $V(X)$?
- c) What is $P(Y \leq \frac{1}{4} \mid X = \frac{1}{2})$?
- d) What is $P(X \leq \frac{1}{2})$?
- e) What is $P(Y \leq \frac{1}{4}, X \leq \frac{1}{2})$?
- f) What is $P(Y \leq \frac{1}{4} \mid X \leq \frac{1}{2})$?
- g) What is $E(Y)$?
- h) What is $E(XY)$?