- 1. Consider the triangle with vertices (0,0), (1,0) and (0,1). Suppose that (X,Y) is uniformly chosen random point from this triangle.
 - (i) Find the marginal p.d.f. of X.
 - (ii) Fix $x \in (0, 1)$. Find the conditional p.d.f. of Y given X = x.
 - (iii) Compute $\mathbb{P}(X > Y)$.
- 2. Let X and Y be two independent random variables with

$$\mathbb{P}(X=1) = \mathbb{P}(X=-1) = \frac{1}{2}$$
, and $\mathbb{P}(Y=1) = 1 - \mathbb{P}(Y=-1) = \frac{2}{3}$.

Argue, with reason, whether the two random variables Y and XY are independent or not?

3. Suppose that X and Y are integer-valued random variables with joint p.m.f. given by

$$f_{X,Y}(a,b) = \begin{cases} \frac{1}{4a}, & \text{for } 1 \le b \le a \le 4\\ 0, & \text{otherwise.} \end{cases}$$

- (i) Find the marginal p.m.f.s of X and Y.
- (ii) Find $\mathbb{P}(X = Y + 1)$.