

Q1. Suppose that  $(X_1, X_2)$  is a *discrete* random variables such that the point  $(1,2)$  occurs with probability  $\frac{1}{8}$ , point  $(1,3)$  occurs with probability  $\frac{3}{8}$ , point  $(2,3)$  occurs with probability  $\frac{1}{4}$ , point  $(3,1)$  occurs with probability  $\frac{1}{4}$ .  
Answer the following:

1.  $P(X_1 - X_2 \geq 1)$

2.  $P(X_1 > 1, |X_2| < \frac{5}{2})$

Q2. Let  $X$  and  $Y$  have the joint probability density function given by

$$f(x, y) = \frac{x^2}{4}, 0 < y \leq x < 2 \quad (1)$$

Find the value of  $P(X \leq 2Y)$