MSO205 PRACTICE PROBLEMS SET 3

Question 1. Fix $p \in (0,1)$. Suppose we have a coin such that tossing it results in a head with probability p and a tail with probability $1-p$. The coin is tossed twice independently and the number X of heads is observed.

(i) Compute $\mathbb{P}(X^{-1}(A))$ for all subsets A of $\mathbb{R}$.

(ii) Find the DF of X.

Question 2. Fix $p \in (0,1)$. Suppose we have a coin such that tossing it results in a head H with probability p and a tail T with probability $1-p$. Consider the random experiment of tossing the coin once and look at the following RV $X : \Omega \to \mathbb{R}$ given by $X(H) = 1, X(T) = -1$.

(i) Compute the law $\mathbb{P} \circ X^{-1}$, i.e. find $\mathbb{P} \circ X^{-1}(A)$ for all subsets A of $\mathbb{R}$.

(ii) Find the DF of X.

Question 3. Suppose that an event A is independent of itself. What can you say about $\mathbb{P}(A)$?