PROBLEMS - SET 2

Problem 1. Prove that the distribution μ_X of the random variable X is a probability.

Problem 2. Prove that the distribution function F_X is

  (i) non decreasing,

 (ii) $\lim_{x \to -\infty} F_X(x) = 0$,

(iii) $\lim_{x \to +\infty} F_X(x) = 1$,

(iv) right continuous.

Problem 3. An urn contains 8 white balls and 4 black balls. You toss a fair coin: if it shows *head* you make two draws *with* replacement, otherwise you make two draw *without* replacement. Let X be the number of white balls drawn. Compute mean and variance of X.

Problem 4. In the context of Problem 5 of set 1, let X denote the number of individuals, different from 1 and 2, which are friends with 1 but *not* friends with 2. Compute the density of X.

Problem 5. 120 students are divided into three groups, called A,B and C, containing respectively 36,40 and 44 students.

  (i) Choose at random a group (I mean: each group has the same probability of being chosen), and let X be the number of students in the chosen group. Determine the density of X.

 (ii) Choose a student at random, and let Y denote the number of students in his/her group. Determine the density of Y.

Problem 6. Let X be a E-valued random variable. Show that there is at most one $c \in E$ such that $P(X = c) > \frac{1}{2}$.