I. Homework 2

A. Problem 1

An entire output of a factory is produces on 4 machines: machine 1 accounts for 20%, machine 2 accounts for 30%, machine 3 accounts for 10% and machine 4 accounts for 40%, respectively. The fraction of defective items produces is: for machine 1 - 10%, for machine 2 - 15%, for machine 3 - 1%, for machine 4 - 30%. 1) What is the probability that the item (if chosen at random) is defective? 2) If an item is chosen at random form the total output and is found to be defective, what is the probability that it was made on machine 3?

B. Problem 2

Urn 1 contains 10 red and 2 green marbles, while Urn 2 contains 3 red and 12 green marbles. We pick an urn at random with probability 1/2, and then select a marble from the urn with equal probability for each one. We learned that a red marble was selected (but we do not know from what urn). Find the probability that it was taken from Urn 2.

C. Problem 3

We are given two coins. We know that one of the coins is fair (with probability 1/2 for each outcome), and one is fake, with probability 3/5 for heads and 2/5 for tails. We do not know which one is fair and which one is fake. We randomly picked a coin (with equal probability for each one of the two), and tossed it once. The result was heads. With what probability can we conclude the coin we picked was the fake coin?

D. Problem 4

Let r.v. X be a number of heads in 3 flips of a fair coin. Please, find 1) the range of this random variable and 2) probability mass function (p.m.f.). 3) check the third property of p.m.f. 4) Find \( P(0 < X \leq 2) \).