Assignment 1

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Instructions

To pass, a group submits at least one solution to one out of the two problems, these solutions need to contain careful motivation for each step taken. This is done by commenting on each equality, inequality and implication. I require this because it will give you an idea of what is considered a proper solution on the exam. That way you wont loose points on the exam due to "communication problems" and/or misunderstandings. Think of it as a soft yet hard training environment. The last question is just a fun thought experiment which is not mandatory and can be answered any way one likes. Finally, one single PDF file is to be submitted and it should contain the names of all group members. If there are more then one file, merge them somehow into one. Good luck!

Problem 1

Three groups of students called 1,2 and 3 hand in solutions to a problem. The probabilities that they succeed are independent and are 0.2, 0.3 and 0.9 respectively. Calculate the probability that (i) all groups succeed and (ii) all groups fail.

Problem 2

Suppose that X and Y are discrete random variable defined on a finite sample space. Prove that $\mathbb{E}[\mathbb{E}[X \mid Y]] = \mathbb{E}X$

Hint Problem 2

Recall that the events $\{\omega : Y = y\}$ is a partition of Ω and that the word partition have a certain meaning in mathematics. Also if we change the order of summation in a double sum, where both index are finite, the sum stays the same, i.e the sums commute.