MA 519: Homework 1

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Problem 1.1 (Handout 1, # 5)

A closet contains five pairs of shoes. If four shoes are selected at random, what is the probability that there is at least one complete pair among the four?

Solution. ▸

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Problem 1.2 (Handout 1, # 7)

A gene consists of 10 subunits, each of which is normal or mutant. For a particular cell, there are 3 mutant and 7 normal subunits. Before the cell divides into 2 daughter cells, the gene duplicates. The corresponding gene of cell 1 consists of 10 subunits chosen from the 6 mutant and 14 normal units. Cell 2 gets the rest. What is the probability that one of the cells consists of all normal subunits.

Solution. ▸

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Problem 1.3 (Handout 1, # 9)

From a sample of size n, r elements are sampled at random. Find the probability that none of the N prespecified elements are included in the sample, if sampling is

(a) with replacement;

(b) without replacement.

Compute it for $r = N = 10$, $n = 100$.

Solution. ▸

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Problem 1.4 (Handout 1, # 11)

Text, 1.3.

Solution. ▸

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Problem 1.5 (Handout 1, # 12)

Text 1.6.

Solution. ▸

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Problem 1.6 (Handout 1, # 13)

Text 1.8.

Solution. ▸

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Problem 1.7 (Handout 1, # 16)

Consider a particular player, say North, in a Bridge game. Let X be the number of aces in his hand. find the distribution of be the number of aces in his hand. find the distribution of X.

Solution. ▸

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Problem 1.8 (Handout 1, # 20)

If 100 balls are distributed completely at random into 100 cells, find the expected value of the number of empty cells.

Replace 100 by n and derive the general expression. Now approximate it as n tends to ∞.

Solution. ▸

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