Universität Erlangen-Nürnberg
Department of Computer Science 7
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Introduction to Data Structures and Algorithms

Exercise sheet 11

Exercise 32:

A distributed system has three file servers named A, B, C, which are chosen independently with equal probabilities whenever a new file is created. Determine the probabilities of the following events:

a) Server A is selected
b) Server A or B is selected
c) Server A and B are selected
d) Server A is not selected
e) Server A is selected twice in a row
f) Server selection sequence ABCABCABC is observed (in nine successive file creations)

Exercise 33:

Assume the following random experiment:
A regular dice and a coin are tossed at the same time.

a) Determine the corresponding probability system (S, Φ, P).

b) Compute the probability of appearance "Even number of dice **and** head of coin".

c) Show the linearity of expectation $E[X+Y] = E[X] + E[Y]$ for some suitable random variables $X : S \to R$ and $Y : S \to R$ based on probability system (S, Φ, P).

Exercise 34:

Let $X_1, X_2, \ldots, X_n$ be *n* independent random variable with distribution functions $F_{X_1}, F_{X_2}, \ldots, F_{X_n}$.

a) Let $Y = g(X_1, X_2, \ldots, X_n)$ be the random variable defined by $Y(\omega) = \max\{X_1(\omega), X_2(\omega), \ldots, X_n(\omega)\}$ for each $\omega \in S$.
What is the distribution functions F_Y ?

b) Let $Y = g(X_1, X_2, \ldots, X_n)$ be the random variable defined by $Y(\omega) = \min\{X_1(\omega), X_2(\omega), \ldots, X_n(\omega)\}$ for each $\omega \in S$.
What is the distribution functions F_Y now ?