# Stochastik

## Serie 1

1. a) Ununterscheidbare Münzen:

$$\begin{aligned}\Omega &= \{\{w,w,w\},\{w,w,z\},\{w,z,z\},\{z,z,z\}\}\\ |\Omega| &= 4\\ |\mathcal{F}| &= |\mathcal{P}(\Omega)| = 2^{|\Omega|} = 2^4\\ &= 16\end{aligned}$$

b) Unterscheidbare Münzen:

$$\begin{aligned}\Omega &= \{\{w,w,w\},\{w,w,z\},\{w,z,w\},\{z,w,w\},\{w,z,z\},\{z,w,z\},\{z,z,w\},\{z,z,z\}\}\\ |\Omega| &= 8\\ |\mathcal{F}| &= |\mathcal{P}(\Omega)| = 2^{|\Omega|} = 2^8\\ &= 256\end{aligned}$$

2. $A = \{\{z,z,w\},\{z,w,z\},\{w,z,z\},\{z,z,z\}\}$
$B = \{\{z,z,z\},\{w,w,w\}\}$

a) $A \cup B = \{\{z,z,w\},\{z,w,z\},\{w,z,z\},\{z,z,z\},\{w,w,w\}\}$

b) $\overline{A \cup B} = \overline{A} \cap \overline{B} = \{\{z,w,w\},\{w,w,z\},\{w,z,w\}\}$

c) $A \cap \overline{B} = \{\{z,z,w\},\{z,w,z\},\{w,z,z\}\}$

d) $A \cap B = \{\{z,z,z\}\}$

3. a) Alle drei Ereignisse treten ein:
$\mathcal{F} = (A \cap B \cap C)$

b) Wenigstens ein Ereigniss tritt ein:
$\mathcal{F} = (A \cup B \cup C)$

c) Wenigstens zwei der Ereignisse treten ein:
$\mathcal{F} = ((A \cap B) \cup (B \cap C) \cup (A \cap C) \cup (A \cap B \cap C))$

4. Ich gehe davon aus das ein „vollständiges System“ äquivalent zu dem Ausdruck „vollständiger Satz“ aus der Vorlesung ist.

   $A \cap \overline{A} \cap B = B$
   $A \cap \overline{A} \cap \overline{B} = \overline{B}$
   $B \cap \overline{A} \cap \overline{B} = \overline{A}$
   $B \cap \overline{B} = \emptyset$

   $\mathcal{F} = \{\emptyset, A, B, \overline{A}, \overline{B}, \Omega\}$

5. a) $\mathcal{A} = \{M_{10} \cap W_7\}$

   b) $\mathcal{A} = \{M_i \cap W_k | i \geq 10 \wedge k \geq 6\}$

   c) $\mathcal{A} = \{M_i \cap W_k | i + k = 17\}$

6. $\Omega = \{1, 2, 3, 4, 5\}$
   $A = \{1, 3\}, B = \{2, 4\}, C = \{5\}$
   $\overline{A} = \{2, 4, 5\}, \overline{B} = \{1, 3, 5\}, \overline{C} = \{1, 2, 3, 4\}$

   $\mathcal{A} = \{A, B, C\}$
   $\mathcal{F}(\mathcal{A}) = \{\emptyset, A, B, C, \overline{A}, \overline{B}, \overline{C}, \Omega\}$

   Probe:
   $|\Omega| = 3$
   $|\mathcal{P}(\Omega)| = 2^3 = 8$