Präsenzaufgabe 2

Exercise 1 Let $(\Omega, \mathcal{A}, \mathbb{P})$ be a probability space and let $A, B, C \in \mathcal{A}$ three events such that:

- $\mathbb{P}((B \cup C) \cap A) = 0.4$
- $\mathbb{P}(B \cap \complement A) = 0.3$
- $\mathbb{P}((B \cup C) \cap \complement A) = 0.5$
- $\mathbb{P}(A) = 0.49$
- $\mathbb{P}((A \cup C) \cap B) = 0.35$
- $\mathbb{P}(B \cap C) = 0.26$
- $\mathbb{P}((A \cup B) \cap C) = 0.44$

Compute the probabilities of the following four events:
a) At least two of the events (A, B, C) occurs.
b) Exactly two of the events (A, B, C) occurs.
c) None of the events (A, B, C) occurs.
d) At most one of the events (A, B, C) occurs.

Bonus question: Is it possible to compute the probability of any finite combination of the events (A, B, C) (using operators $\cup$, $\cap$ and $\complement$)?

Exercise 2 We do a infinite coin flip experiment (Unendlich oft wiederholter Münzwurf). We assume (unless stated otherwise) that the probability of flipping *Tails* on each coin flip is $p = 1/2$.
a) What is the probability that the first time you flip *Tails* is at the $n = 2^{nd}$ throw?
b) What is the probability that the first time you flip *Tails* is at the $n = 3^{rd}$ throw?
c) What is the average number n of throws at which you flip the first *Tails*?
d) Answer the previous question, but assuming the coin has $p = 1/3$ probability of flipping *Tails* at each flip.
e) Is there a value p such that the answer to question c) is 5?
If so, what is that value of p?