

# Introduction to Probability Theory I

## Exercise 5, Autumn 2008

1. Consider an experiment that consists of throwing two dice. Let

$A =$  "sum of results is 6",

$B =$  "result of the first die is 4".

Are events  $A$  and  $B$  independent? What happens if  $A$  is replaced by event "sum of results is 7"?

- 2\* Let  $A$  and  $B$  be events in a probability space  $(\Omega, \mathcal{F}, P)$ . Show that, if  $P(B|A) = P(B|A^c)$ , then  $A \perp B$ .
3. Assume that  $A, B$  ja  $C$  are events and  $P(A) = P(B) = P(C) = 0,25$ . Find  $P(A \cup B \cup C)$ , if
  - a)  $A, B$  and  $C$  are independent;
  - b)  $A$  and  $B$  are independent,  $A$  and  $C$  are independent, and  $B$  and  $C$  are mutually exclusive events.
4. Mr K claims that he can find water with a magic wand. The neighbours decide to test his claim. Ten times they give him two barrels to test, one empty and other filled with water. Mr K must detect the barrel filled with water. Find the probability that Mr K picks correct barrel at least eight times, if he
  - a) picks barrel randomly,
  - b) picks correct barrel with probability 0.8.
- 5\* A forgetfull gentleman forgets his umbrella to a store with probability  $\frac{1}{4}$ . One day he visits four stores and notices what he has forgotten his umbrella to one of those. Find the probability that the umbrella is in each of these four stores.
6. A lost letter has probability  $\frac{1}{2}$  of being in one of six drawers. Find the probability that letter is in the sixth drawer given that first five drawers have been searched in vain.