

## Exercises for the lecture

### *Collaborative transmission in wireless sensor networks*

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## 4 Riddles and quiz shows

### 4.1 Yet another quiz show

Three friends participate in a quiz show. As usual in this show, each of the participants is put on a random-coloured hat (red or green independently with probability 0.5 each). Each candidate can see the colours of the hats of the others but not the color of the own hat. Communication during the quiz-show is prohibited (while communication prior to the show can, of course, not be prevented).

Each candidate gives one secret vote or abstains.

The candidates win a wide-screen display (wow!) when at least one of the votes is correct and none wrong. How should the candidates behave in order to maximise the success probability. (Assertion: A success probability of more than 0.5 is possible)

### 4.2 Casualties in the middle ages

Statistics from the middle ages show that a combatant returns from a battle uninjured only with probability 0.681. From the casualties, 85% have lost an ear, 80% lost an eye, 75% lost an arm and 70% lost a leg. Clearly, the probability for the different injuries are not necessarily independent.

What is the minimum probability to lose an ear, an eye, an arm and a leg at the same time?

### 4.3 Finding the witch

In ancient times it was said that there is a chance of 4 out of 5 to find a witch in one of the eight caves of the Brocken near Brunswick at Walpurgis night.

Two adventurers climb the hill and visit seven of these caves without finding one. What is the probability to find a witch in the eighth cave?