

Meeting 3:

Probabilities and reasoning

The bet experiment for finding your personal probability

- Let E denote the event/statement of which you are supposed to assign your personal probability p_E
- Consider this bet:
 - You win the amount A if E occurs
 - You lose the amount B if E does not occur
- Which amounts A and B are such that you are indifferent between taking the bet or not?
- Let these amounts be A_0 and B_0 .

$$\Rightarrow A_0 \cdot p_E - B_0 \cdot (1 - p_E) = 0 \quad \Rightarrow p_E = \frac{B_0}{B_0 + A_0}$$

Discuss using this strategy your personal probabilities for

- It will rain tomorrow
- You will get a job sooner than six months after your graduation
- Your bicycle will be stolen tonight

Tip: Start with $A = B$ and then move either in **direction $A < B$** or $A > B$

The Monty Hall problem

Suppose you're on a game show, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say No. 1, and the host, who knows what's behind the doors, opens another door, say No. 3, which has a goat. He then says to you, "Do you want to pick door No. 2?" Is it to your advantage to switch your choice?

The two envelopes problem

Someone is offering you to choose one of two closed envelopes.

You are informed that one envelope contains a certain amount of money, and the other contains double that amount, but you of course are not informed about which is which.

You choose one envelope and are told to open it. In it you find x Euros.

You are now asked if you wish to change envelope and that would be your final choice.

- Should you change?
- Does it matter what x is?