# Meeting 3:
# Problem seminar part

## *A 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 $B_0$.

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

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 are the one who won the game.

You are therefore asked to choose one of three doors, and you will eventually get what’s behind it.

You are told that 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 instead?"

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?