Masco: follow-along with R

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Probability space

The following code build a random experiment which consists in a single coin toss with fair and not fair coin. *Check the usage of the function 'sample' typing '?sample' in the R-console.*

```
Omega = data.frame(Result = factor(c("Head","Tail")))
# Fair coin
sample(Omega$Result, size = 1)

# not fair coin
sample(Omega$Result, size = 1, prob = c(1/3,2/3))
```

Questions:

- Check that the relative frequency of getting a 'Head' for the not fair coin is converging to 1/3.
- Consider the 6-sided dice tossing experiment. Check that the relative frequency of getting 6 is converging to 1/6.
- Consider the **two 6-sided dice** tossing experiment.
  - evaluate the probability of the events $A =$ 'the sum of result is greater than 6'; $B =$ the sum of result is even.
  - evaluate the probability of $A \cup B$, $A \cap B$, $A \Delta B$.

Empirical probability

- Using ggplot reproduce the graphic illustrating relative frequency for coin tossing appearing in the first lecture note. *Hint: in addition to the R-package 'ggplot2', you might want to use 'reshape2', more specifically the function 'reshape'.*

Exercise Birthay

Suppose there are n people in a room. What is the probability that at least two people have a common birthday ? We suppose each day is equally likely. Write an R function to visualize this probability as a function of n. *going further, we can try to use the R-function 'Vectorize' to simplify your code.*