Practicals 2

1. Import the people data frame (used in the first and second practicals) in R again.
Compute means and variances of heights for each group defined by a combination of eye colour and sex.

2. Imagine, you measure plant height in a field measurement. Population mean is 25.5 cm and standard deviation is 2.4. You take 10 measurements. Simulate this process in R and report the values of sample mean with its standard error and sample variance. What happens with the mean and variance if you misplace the decimal point and multiply one of the sampled values by 10. What happens with median?
How would the situation look like if the sample was 10 x larger (i.e. 100 measurements were taken)?

2. You toss a coin three times and get head in all cases. What is the likelihood that the coin is fair? If the coin is fair, what is the probability of getting eagle in the next toss.

3. You are a farmer cultivating pumpkins on a 2 hectare field with homogeneous environmental conditions. Mass of individual pumpkins at harvest follows normal distribution with mean = 2.1 kg and variance = 0.9.
   (a) What is the probability that a randomly selected pumpkin will be heavier than 2.5 kg?
   (b) What would be the financial value of your harvest if mean pumpkin production is 1 pumpkin /m^2 and the pumpkins are sold for prices based on size classes summarized in a table below

Pumpkin size	Unit price (Euro)
< 0.5	0
0.5-0.8	0.5
0.8-1.6	1.3
1.6-2.5	2
2.5-4.0	3
>4.0	5

A. Assume that the time needed to reach the Brno train station by walking is a random variable with mean = 40 and variance = 6. How many minutes before your train leaves, you must leave the campus to have 90% probability to catch the train?

B. Imagine that the mean life expectancy in Czech Republic is a random variable with mean = 81 and SD = 9. How many people of the 10.6 million inhabitants do you expect to reach more than 100?

CDEF. Assume that height of students follows the normal distribution with mean = 179 cm and variance = 121.

C. What is the probability that a randomly selected student will be tall between 170 and 190 cm?

D. You are a chair designer. For which height range you should design chairs to be suitable for 99% of students (and the remaining 1% was distributed symmetrically, i.e. the chairs were too small for

0.5% and too big for 0.5%.)?

E. You are a chair designer. For which height range you should design chairs not to be too small for 95% of students?

F. How many potential basket-ball players (height equal or higher than 200 cm) would you expect in a sample of 550 students?