

Exercise Sheet 9

Exercise 31

A florist buys easy perishable flowers from a wholesaler for 3 Euro per piece and sells the bought flowers for 7 Euro per piece. Each flower not sold on the first day is worthless and trashed. The number X of flowers demanded per day is a random variable with following distribution:

k	0	1	2	3	4	5	6
$P[X=k]$	0.01	0.02	0.03	0.04	0.05	0.1	0.2
k	7	8	9	10	11	12	>12
$P[X=k]$	0.2	0.1	0.09	0.08	0.07	0.01	0

Implement a simulation with the given requirements and run it for 1 year. Answer subsequent questions using a graphical visualization:

- (a) How many flowers must the florist buy daily for maximizing the profit?
- (b) If the florist buys too many flowers a day, this will result in an expected loss. What is the corresponding threshold (number of flowers bought)?

Exercise 32

Use your implementation of the previous example and graphically visualize the confidence interval in dependency of the number of simulated days (plot the mean profit, upper and lower CI). How many days must the number of simulated days be in order to reach an accuracy of the estimator of $\pm 1\%$ with a 99% confidence?

Exercise 33

The flower shop from exercise 31 builds a cold storage. Hence, the shop is able to sell flowers for one single day after they were purchased for a price of 5 Euro, but only if all flowers (the ones purchased for the day) already have been sold and there is further demand.

Analyze if the introduction of the cold storage did cause a significant change on the profits expectation value at a daily flower purchase of 5 or 10 flowers (1% level of significance). At what approximate sample size (number of simulated days) is the statistical test able to recognize the additional returns? Justify the choice of the appropriate statistical test.

Exercise 34

Presenting results is an important part of statistical analysis. Therefore, summarize the results of examples 31-33 briefly and concisely on one A4 page so that someone can make an informed decision about the florist's business management based on the data in your summary.

Important: this task should not be solved as a group but individually. Your presentation must be submitted in advance. We will discuss the pros and cons of the single presentations during class.