

Bus 273: Statistical Analysis for Business

Fall 2009

PROBLEM SHEET # 5

Problem 1: Tourists sometimes need medical treatment abroad. In an effort to analyze high treatment costs (above €1000) of tourist patients, the management of a hospital in Germany has drawn a sample of size 50 from each of two groups:

First sample: Treatment cost of 50 patients living as singles:

1030, 1050, 1050, 1080, 1080, 1100, 1160, 1160, 1190, 1190
1230, 1230, 1230, 1260, 1280, 1310, 1340, 1340, 1360, 1390
1440, 1470, 1530, 1590, 1590, 1630, 1690, 1760, 1760, 1830
2060, 2100, 2410, 2550, 2760, 2870, 2870, 3170, 3360, 3860
4520, 4610, 4790, 5290, 5500, 5720, 6310, 6560, 6960, 7530

Second sample: Treatment cost of 50 patients living in families:

1030, 1050, 1050, 1060, 1060, 1080, 1100, 1100, 1120, 1120
1180, 1200, 1220, 1220, 1260, 1290, 1290, 1330, 1330, 1360
1400, 1400, 1400, 1430, 1450, 1500, 1580, 1580, 1700, 1790
1790, 1820, 1820, 1820, 1850, 1880, 2090, 2130, 2240, 2400
2400, 2490, 2660, 2660, 2810, 2910, 3460, 3770, 3970, 4330

- Explain why there is a need to summarize data in this example.
- Draw a boxplot for each dataset.
- On the basis of your boxplots: What can you say about the skewness of the empirical distributions? Where would you expect the arithmetic means to lie?
- Now compute the arithmetic means. Mark them into your boxplots. Are they where you expected them to be? (Hint: The sums of the numbers are 126150 for the first and 89980 for the second sample.)
- The standard deviation is 1821 for the first and 809 for the second sample. Do you think this information is of any use in this example?

Problem 2: There is an alarm system in a production plant. In long series of experiments, it was found that the accuracy of the alarm system can be described as follows:

- In the case of a burglary, the alarm will be activated with probability 0.99.
- In a night without burglary, the alarm will be activated with probability 0.01.

The probability of a burglary in a typical night is $p_1 = 1/250$.

- The alarm is activated. Find the probability that there was actually a burglary.
- Now assume that the watchman has heard a suspicious noise even before the alarm was activated. He concludes: The probability of a burglary tonight is not $p_1 = 1/250$, but $p_2 = 1/10$! Indeed, the alarm is activated. Find the probability that the alarm was triggered by a burglar.