Introduction to the Practice of Statistics

List 4

Laboratory

1. Generate:

   (a) a 5-element sample for the distribution $N(0,1)$ and a 10-element sample for the distribution $N(20,10)$

   (b) a 5-element sample for the distribution $N(0,1)$ and a 10-element sample for the distribution $N(20,1)$

   (c) a 10-element sample for the distribution $N(0,1)$ and a 10-element sample for the distribution $N(20,10)$

   For each case construct a 95% confidence interval for the difference $\mu_2 - \mu_1$ – one using unpooled SE, the other using pooled SE.

   Repeat the experiment 1000 times and for each case compare the probabilities of covering $\mu_2 - \mu_1$ for both intervals and the average lengths of the intervals.

2. Data set `chol.txt` contains cholestorol levels of patients a few days after a heart attack.

   (a) Draw histograms and QQ-plots of cholesterol levels for the control group and patients 2, 4 and 14 days after a heart attack.

   (b) Draw box plots comparing cholesterol level distribution for the control group and patients 2 days after a heart atteck.

   (c) Compare cholesterol levels for the control group and patients 2 days after a heart atteck using Student's t-test for two samples.

3. Referring to the data set `income.dat`:

   (a) Draw QQ-plots for income, separately for women and men. Summarize the results.

   (b) Define a new variable $Y = D^{0.25}$ (where D is income) and draw QQ-plots for Y. Summarize the results.

   (c) Apply the Student's t-test for two samples to test if the mean value of Y is larger for men than for women. Draw conclusions.

   (d) Create a single chart comparing box-plots for Y for different education levels. Summarize the results.

   (e) Apply the Student's t-test to check if the mean value of Y for people with postgraduate degree is significantly higher than for people with bachelor's degree. Draw conclusions.

   (f) Create a single chart comparing box-plots for Y for the three job classes.

   (g) Apply the Student's t-test to compare the mean values of Y for people in private sector with the people in public sector. Draw conclusions.