7. seminar

Problem 1
Eleven equally-old piglets were drawn randomly from a population of a particular race. Six of them had been served superalimentation I and remaining five superalimentation II for a half year. The mean daily increases in weight were recorded (in Dg.):
superalimentation I: 62, 54, 55, 60, 53, 58
superalimentation II: 52, 56, 49, 50, 51.
The data are assumed to be realization of two independent random samples following distributions $N(\mu_1, \sigma_1^2)$ and $N(\mu_2, \sigma_2^2)$.

a) Determine the 95% confidence interval estimate for a quotient of population variances $\frac{\sigma_1^2}{\sigma_2^2}$.

b) Assuming that the data follow distributions $N(\mu_1, \sigma^2)$ and $N(\mu_2, \sigma^2)$, determine the 95% confidence interval estimate for the difference of the expected values $\mu_1 - \mu_2$.

To make the calculation easier realizations of following sample statistics are available:
$m_1 = 57 \;\; m_2 = 51,6 \;\; s_1^2 = 12,8 \;\; s_2^2 = 7,3$

Problem 2
Using the data from exercise 1 test at $\alpha = 0.05$ the hypothesis that:

a) the variances of increases in weight are equal (irrespective of the type of superalimentation).

b) both superalimentation have the same effect on the piglets' increases in weight.

Use both confidence interval method and classical method of hypothesis testing.

Problem 3

a) Six farrows and in each farrow two siblings were drawn randomly. One of them had been served superalimentation I and the second one superalimentation II for a half year. The mean daily increases in weight were recorded (in Dg.):
$\binom{62}{52}, \binom{54}{56}, \binom{55}{49}, \binom{60}{50}, \binom{53}{51}, \binom{58}{50}$.
Determine 95% confidence interval estimate for $\mu = \mu_1 - \mu_2$.

b) At the significance level $\alpha = 5\%$ test the hypothesis that both superalimentation have the same effect on the piglets' increases in weight.

Problem 4
Two independent random samples are given. The first one is of size 10 and follows $N(2; 1,5)$. The second sample is of size 5 and follows $N(3; 4)$. Find the probability that the sample mean of the first sample is less than the sample mean of the second sample.