MULTIVARIATE STATISTICS, Problems to Lesson 6.

1. 49 old patients are classified into 2 groups according to whether there is a factor of insenity (Group I.) or not (Group II.) in their behaviour. Then they solved 4 psychiatric tests (1.information, 2.similarity, 3.arithmetics, 4.ability to recognize pictures), for which the average of the given scores are as follows:

	$I.(n=37)$	$II.(m=12)$
1.	12.57	8.75
2.	9.57	5.33
3.	11.49	8.50
4.	7.97	4.75

   Investigate, whether the results of the two groups differ significantly, with 95% confidence. Suppose that the test results follow 4-variate normal distribution for which, the inverse of the pooled variance $\mathbf{S} = \mathbf{S}_I + \mathbf{S}_{II}$ is

$$\mathbf{S}^{-1} = \begin{pmatrix} 0.0052 & -0.0028 & -0.0012 & -0.0012 \\ -0.0028 & 0.0038 & -0.0008 & -0.0002 \\ -0.0012 & -0.0008 & 0.0030 & -0.0004 \\ -0.0012 & -0.0002 & -0.0004 & 0.0042 \end{pmatrix}.$$

2. The effects of 3 stimulating pills (A, B, C) are investigated on 20 young men from the point of view of reaction time (sec/100):

$$\bar{X}_A = 21.05 \qquad \bar{X}_B = 21.65 \qquad \bar{X}_C = 28.95$$

$$\mathbf{S} = \begin{pmatrix} 45.2 & 43.6 & 32.6 \\ 43.6 & 53.2 & 36.4 \\ 32.6 & 36.4 & 49.4 \end{pmatrix}.$$

   Investigate, whether the effects of the 3 pills differ significantly, with 95% confidence. Hint: use a self-control test for the differences $B - A$, $C - B$!