1. A study whether jogging leads to a reduction in one's pulse rate gave the following results in 3 persons respectively before and after jogging:

72, 86, 98

70, 87, 96.

i. Using t-test for these paired experiments, is a reduction in pulse rate can be decided with 10% significance?

ii. Approximate the P-value for non-significance of jogging in reducing the pulse rate via t-test.

2. Will $n = 49$ be a sufficiently large sample size to test $\mu = 10$ versus $\mu > 10$ at the $\alpha = 0.05$ significance level and **even smaller type 2 error**, if the experimenter wants to reject the null hypothesis, when $\mu \geq 12$, given that standard deviation of normally distributed measurements $\sigma = 4$?

3. Independent random samples were selected from each of two normally distributed populations, $n_1 = 3$ from population 1 and $n_2 = 3$ from population 2. The data are shown in the following table:

Sample 1	Sample 2
3.1	2.3
4.3	1.4
1.2	3.7

i. Test $H_0 : \sigma_1 = \sigma_2$ *vs.* $H_a : \sigma_1 < \sigma_2$. Use $\alpha = 0.01$

ii. Test $H_0 : \sigma_1 = \sigma_2$ *vs.* $H_a : \sigma_1 > \sigma_2$. Use $\alpha = 0.01$

iii. Test $H_0 : \sigma_1 = \sigma_2$ *vs.* $H_a : \sigma_1 \neq \sigma_2$. Use $\alpha = 0.10$

iv. Test equality of the means with two-sample t-test assuming that $H_0 : \sigma_1 = \sigma_2$ is not rejected.

v. Find P-value for equality of the means with the permutation test.

4. In a town lottery, *each player* has a $1/(2\ 000\ 000)$ chance of winning.

a. If one million people play (all independently), what is the chance that at least one player wins?