Statistics' mini-course HW

due to 20 October, 23:59

Problem 1 Consider two independent observations of a random variable:

$$x_1 = 0.2$$

$$x_2 = -0.3$$

Find the most powerful test for which the first kind of error is less than $\varepsilon = 0.0314$ for two following simple hypothesis:

$$H_0 : U[-0.5, 0.5](\text{uniform distribution})$$

$$H_1 : \mathcal{N}(0, 1)(\text{normal distribution})$$

Problem 2 Consider the following table

x_i	1	3	7	2	9
y_i	8.2	6.9	1.9	7.1	0.3

Let y_i depend on x_i as linear function for all i, namely,

$$y_i = \theta_1 + \theta_2 x_i$$

with unknown coefficients θ_1, θ_2. Find θ_1 and θ_2 via RSS (the residual sum of squares) method and draw the corresponding figure with data points and optimal linear function.