Домашнее задание 6

12 мая 2022

Задание 1. Periodically, Merrill Lynch customers are asked to evaluate Merrill Lynch financial consultants and services. Higher ratings on the client satisfaction survey indicate better service, with 7 the maximum service rating. Independent samples of service ratings for two financial consultants are summarized here. Consultant A has 10 years of experience, whereas consultant B has 1 year of experience. Use $\alpha = 0.05$ and test to see whether the consultant with more experience has the higher population mean service rating. 1 б.

- Consultant A: $n = 16$, mean rating = 6.82, sample dev = 0.64
- Consultant B: $n = 19$, mean rating = 6.25, sample dev = 0.75

Задание 2. MM/MARS, makers of MM® chocolate candies, conducted a national poll in which more than 10 million people indicated their preference for a new color. The tally of this poll resulted in the replacement of tan-colored MMs with a new blue color. In the brochure "Colors," made available by MM/MARS Consumer Affairs, the distribution of colors for the plain candies is as follows: 1 б.

Brown	Yellow	Red	Orange	Green	Blue
30%	20%	20%	10%	10%	10%

In a follow-up study, samples of 1-pound bags were used to determine whether the reported percentages were indeed valid. The following results were obtained for one sample of 506 plain candies.

Brown	Yellow	Red	Orange	Green	Blue
117	135	79	41	36	38

Use $\alpha = 0.05$ to determine whether these data support the percentages reported by the company.

Задание 3. 1 б.

Part variability is critical in the manufacturing of ball bearings. Large variances in the size of the ball bearings cause bearing failure and rapid wearout. Production standards call for a maximum variance of .0001 when the bearing sizes are measured in inches. A sample of 15 bearings shows a sample standard deviation of .014 inches. Use $\alpha = 0.10$ to determine whether the sample indicates that the maximum acceptable variance is being exceeded. Assume that the sizes of ball bearings could be well approximated by a normal distribution.

Задание 4. Пусть $x_1, \dots, x_n \sim N(a_1, \sigma^2)$ и $y_1, \dots, y_n \sim N(a_2, \sigma^2)$, где σ^2 известна, и $\rho(x_i, y_i) = \rho > 0$ для любого $i = 1, \dots, n$. 3 б.

Хотим проверить гипотезу $H_0 : a_1 - a_2 = 0$ против $H1 : a_1 - a_2 \neq= 0$.

- Примените t-test для независимых выборок для данной гипотезы.
- Продемонстрируйте, как себя ведут ошибки первого и второго рода для $\rho > 0$ и $\rho < 0$. Критерий является радикальным/точным/консервативным?