T_9

	0	1	2	3	4	5	6	7	8	9
m_i	5	8	6	12	14	18	11	6	13	7

$n=100$

a)

Критерий согласия χ^2

$p_0 = \dots = p_9 = \frac{1}{10}$ $\qquad np_i = 10$

$+ \dots + (7-0{,}7)^2 \frac{10}{7} =$

$\tilde{\Delta} = \frac{1}{10}\left(\sum_{i=1}^{9}(m_i-10)^2\right) = 16{,}4$

$\Delta \sim \chi^2(9)$

$p\text{-value} = P(\Delta \geq \tilde{\Delta} \mid H_0) = \int_{16{,}4}^{+\infty} q_{\chi^2(9)}(t)\,dt = 0{,}058 > \alpha$

нет оснований отвергать H_0

Критерий Колмогорова

$\xi \sim R[0, 9]$ – непрер.

$H_0 : \uparrow$

$H_1 : \overline{H_0}$

$$\vec{x}_n = (\underbrace{0 \ldots 0}_{5}, \underbrace{1, \ldots, 1}_{8}, \ldots, \underbrace{9, \ldots, 9}_{7})$$

$\tilde{F}$ на python

$$\tilde{\Delta} = \sqrt{n} \max(\ldots) = 1{,}43$$

$$\Delta \sim K(x)$$

$$\text{p-value} = P(\Delta \geq \tilde{\Delta}) = 1 - P(\Delta < \tilde{\Delta} \mid H_0) =$$

$$= 1 - K(\tilde{\Delta}) =$$

$$= -2\sum_{k=1}^{\infty} (-1)^k e^{-2k^2 \tilde{\Delta}^2} = 0{,}032 < \alpha$$

отвергаем

б) ~~$\xi \sim N(\theta_1, \theta_2^2)$~~

в) $H_0: \xi \sim N(\theta_1, \theta_2^2)$, $\theta_2 > 0$

$H_1: \overline{H_0}$

A_i : $(-\infty, 1)$ $[1, 2)$ $[2, 3)$ $[3, 4)$ $[4, 5)$ $[5, 6)$ .... $[9; +\infty)$

m_i : 5 8 6 12 ... 7

$np_i > 5$ повезло

$$P(A_0) = \int_{-\infty}^{1} \frac{1}{\sqrt{2\pi}\,\theta_2} e^{-\frac{(\theta_1 - x)^2}{2\theta_2^2}} dx = p_0$$

$$P(A_1) = \int_{1}^{2} \frac{1}{\sqrt{2\pi}\,\theta_2} e^{-\frac{(\theta_1 - x)^2}{2\theta_2^2}} dx = p_1$$

$\vdots$

$$p_9 = P(A_9) = \int_{9}^{+\infty} p(x)\, dx$$

$$L(\vec{\theta}) = (p_1)^5 \cdot (p_2)^8 \cdot \ldots \cdot (p_9)^7 \to \max$$

$\tilde{\theta}_1 = 5{,}28$

$\tilde{\theta}_2^2 = 2{,}679$

$\tilde{\Delta} = 9,8$

$\Delta \sim \chi^2(10 - 1 - 2) = \chi^2(7)$

$\infty)$ p-value $= P(\Delta \geq \hat{\Delta} \mid H_0) = 0,2 > \alpha$

нет оснований
отвергнуть H_0

Критерий Колмогорова

$H_0: \xi \sim N(\theta_1, \theta_2^2)$

$H_1: \overline{H}_0$

$\tilde{\theta}_1 = \overline{x}$ $\quad\quad$ $\tilde{\theta}_2^2 = S^2$ несмещ оценка

$\hat{\Delta} = 1,002$

p-value $= 0,82 > \alpha$

нет оснований отвергнуть H_0