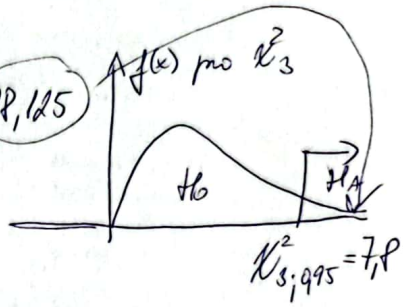
1.)

| | jídlo | nápoje | textil | hračky/dekor. | |
|---|---|---|---|---|---|
| domácí | 10 | 50 | 10 | 10 | 80 |
| cizinci | 30 | 30 | 30 | 30 | 120 |
| | 40 | 80 | 40 | 40 | 200 |

1.) $H_0$: typ produktu a národnost jsou nezávislé
$H_A$: — " — — nejsou —"— $\alpha = 5\%$

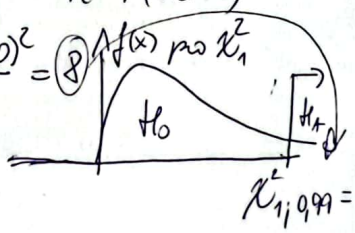
$$\chi^2 = \frac{(10 - \frac{80\cdot 40}{200})^2}{\frac{80\cdot 40}{200}} + \frac{(50 - \frac{80\cdot 80}{200})^2}{\frac{80\cdot 80}{200}} + \dots + \frac{(30 - \frac{120\cdot 40}{200})^2}{\frac{120\cdot 40}{200}} = 28{,}125$$




$H_0$ zamítáme ve prospěch $H_A$ na hl. $\alpha = 5\%$ ∈

2.) $H_0$: $p_D = p_C = \frac{1}{2}$, kde $p_D = P(\text{domácí})$, $p_C = P(\text{cizinec})$
$H_A$: $p_D \neq p_C$ $\alpha = 1\%$

$$\chi^2 = \frac{(80-100)^2}{100} + \frac{(120-100)^2}{100} = 8$$




⇒ $H_0$ zamítáme ve prospěch $H_A$ na hl. $\alpha = 1\%$

2.) 1.) (a)
$$TP = \begin{pmatrix} 1/6 & 5/6 & 0 & 0 & 0 & 0 & 0 \\ 1/6 & 0 & 5/6 & 0 & 0 & 0 & 0 \\ 1/6 & 0 & 0 & 5/6 & 0 & 0 & 0 \\ 1/6 & 0 & 0 & 0 & 5/6 & 0 & 0 \\ 1/6 & 0 & 0 & 0 & 0 & 5/6 & 0 \\ 1/6 & 0 & 0 & 0 & 0 & 0 & 5/6 \\ 1/6 & 0 & 0 & 0 & 0 & 0 & 5/6 \end{pmatrix}$$

(b) $\overline{\pi}_1 = \frac{1}{6}\overline{\pi}_1 + \dots + \frac{1}{6}\overline{\pi}_7 = \frac{1}{6}(\overline{\pi}_1 + \dots + \overline{\pi}_7) = \frac{1}{6}$ (1)

$\overline{\pi}_2 = \frac{5}{6}\overline{\pi}_1 = \frac{5}{6}\cdot\frac{1}{6} = \frac{5}{6^2}$

$\vdots$

$\overline{\pi}_6 = \frac{5}{6}\overline{\pi}_5 = \frac{5^5}{6^6}$

$\overline{\pi}_7 = \frac{5}{6}\overline{\pi}_6 + \frac{5}{6}\overline{\pi}_7 \Rightarrow \overline{\pi}_7 = 5\overline{\pi}_6 = \frac{5^6}{6^6}$ ⇒)

⇒ $\overline{\pi} = (\frac{1}{6}, \frac{5}{6^2}, \frac{5^2}{6^3}, \frac{5^3}{6^4}, \frac{5^4}{6^5}, \frac{5^5}{6^6}, \frac{5^6}{6^6})$

2.) (a) $a = 4/5$, $b = 1$, $c = 1/4$, $d = 2/3$, $e) = 1$ ⇒

(b)
$$TP = \begin{pmatrix} 4/5 & 1/5 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1/2 & 1/4 & 1/4 & 0 \\ 0 & 0 & 0 & 2/3 & 1/3 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$

(c) ozn. $I = \{1,2\}$, $II = \{4,5\}$ a příslušné stac. rozdělení o nich $\overline{\pi}^I$ a $\overline{\pi}^{II}$ resp.

pro I: $\overline{\pi}_1 = 4/5\,\overline{\pi}_1 + \overline{\pi}_2$, $\overline{\pi}_1 + \overline{\pi}_2 = 1$ ⇒ $\overline{\pi}_1 = 5/6$, $\overline{\pi}_2 = 1/6$

$\overline{\pi}^I = (5/6, 1/6, 0, 0, 0)$

pro II.: $\overline{\pi}_4 = 2/3\,\overline{\pi}_4 + \overline{\pi}_5$, $\overline{\pi}_4 + \overline{\pi}_5 = 1$ ⇒ $\overline{\pi}_4 = 3/4$, $\overline{\pi}_5 = 1/4$

$\overline{\pi}^{II} = (0, 0, 0, 3/4, 1/4)$

Stac. rozdělení $\overline{\pi} = k\overline{\pi}^I + (1-k)\overline{\pi}^{II}$, kde $k = P(X_\infty \in I \mid X_0 = 1) = 2/3$ ⇒

⇒ $\overline{\pi} = 2/3\,\overline{\pi}^I + 1/3\,\overline{\pi}^{II} = (5/9, 1/9, 0, 1/4, 1/12)$