

2. koristi rezultat iz prošlog zadatka sa $k = 2 \lg(n)$ u mano upotreb

$$< 2^{-2 \lg(n)} = 2^{\lg(n^{-2})} = n^{-2} = \frac{1}{n^2}$$

3.

$$\Pr\{X > 2 \lg(n)\} = \Pr\{\bigvee_i X_i > 2 \lg(n)\} \leq \sum_i \Pr\{X_i > 2 \lg(n)\} \leq \sum_i \frac{1}{n^2} = \frac{1}{n}$$

$O\left(\frac{1}{n}\right)$

4.

$$\begin{aligned} E[X] &\leq \Pr\{X \leq 2 \lg(n)\} 2 \lg(n) + \Pr\{X > 2 \lg(n)\} n \\ &= \frac{1}{2} 2 \lg(n) + \frac{1}{n} n = 2 \lg(n) + 1 = O(\lg(n)) \end{aligned}$$

2. nje universalan
 $\Rightarrow n=3$ i $a_1 = a_2 = a_3$

987

$$9 \cdot 1 + 8 \cdot 1 + 7 \cdot 1 = 24 \bmod 8 = 0$$

$$1 \cdot 1 + 0 \cdot 1 + 7 \cdot 1 = 8 \bmod 8 = 0$$

izvratnost da se preslikaju u isto γ $1 \rightarrow 1/8$

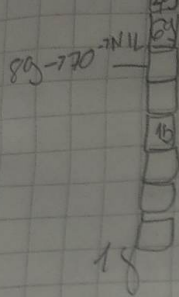
2. zad metodom da su se ključevi poredani po veličini B.
 $\{k_1, \dots, k_n\}$

$$\sum_{j=1}^n P_r(h(k_j) = h(k_i)) = \sum_{j=1}^n 1/m = (n-1)/m$$

prema linearnom odzivanju broj kolona γ suma
 od toga se svaki mogući npramaj element
 kolona

$$\sum_{i=1}^n \frac{n-1}{m} = \frac{n^2 - \frac{n(n+1)}{2}}{m} = \frac{n^2 - n}{2m}$$

3. zad 1) indeks za svako traženje izračunava se uniformno
 svih mogućih indeksa. Budući da imamo n^2



$$h(40) = 2$$

$$2$$

$$h(89) = 13$$

$$13$$

$$h(49) = 11$$

$$11$$

$$h(15) = 15$$

$$15$$

$$h(77, 0) = (h_1(77) + 0 \cdot h_2(77)) \bmod 19$$

$$= 1$$

$$h(89, 0) = h_1(89) \bmod 19 = 13$$

$$h(69, 0) = h_1(69) \bmod 19$$

$$h(89, 1) = (h_1(89) + 1 \cdot h_2(89))$$

$$= (13 + 18) \bmod 19$$

$$= 12$$

$$h(39, 0) = h_1(39) \bmod 19$$

$$= 1$$

$$h(89, 2) = (13 + 3 \cdot 8) \bmod 19$$

$$= 11$$

$$h(39, 1) = (h_1(39) + 1 \cdot h_2(39)) \bmod 19$$

$$h(49, 0) = h_1(49) \bmod 19 = 11$$

$$= (1 + 4) \bmod 19 = 5$$

$$h(49, 1) = (11 + 14) \bmod 19 = 6$$

$$h(70, 0) = h_1(70 \bmod 19) = 13$$

$$h(49, 2) = (11 + 28) \bmod 19 = 1$$

$$h(6, 0) = h_1(6) \bmod 19 = 6$$

$$h(49, 3) = (11 + 42) \bmod 19 = 15$$

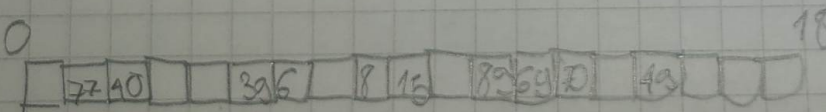
$$h(8, 0) = h_1(8) \bmod 19 = 8$$

$$h(15, 0) = h_1(15) \bmod 19 = 15$$

$$h(40, 0) = h_1(40) \bmod 19 = 2$$

$$h(15, 1) = (15 + 16) \bmod 19 = 12$$

$$h(15, 2) = (15 + 32) \bmod 19 = 9$$



Zad 1.

1. 0^{a)}

0	$h(77) = 77 \bmod 19 = 1 \Rightarrow \text{ułożymy u indeksu } 1$
1	$h(69) = 12$
2	$h(39) = 1$
3	$h(70) = 13$
4	$h(6) = 6$
5	$h(8) = 8$
6	$h(40) = 2$
7	$h(89) = 13$
8	$h(49) = 11$
9	$h(15) = 15$

89-70=19 - NIL

$$b) h(77, 0) = (h_1(77) + 0 \cdot h_2(77)) \bmod 19 \quad h(89, 0) = h_1(89) \bmod 19 = 1$$

$\neq 1$

$$h(69, 0) = h_1(69) \bmod 19$$

$\neq 12$

$$h(39, 0) = h_1(39) \bmod 19$$

$= 1$

$$h(89, 1) = (h_1(89) + 1 \cdot h_2(89))$$

$$= (13 + 18) \bmod 19$$

$$= 12$$

$$h(89, 2) = (13 + 3 \cdot 8) \bmod 19$$