2. A - prefiksni, jedn. dekod

B - jedn. dekod,

$D_1 = a$	3	λ
$D_2 = b$	5	$\lambda\lambda$
$D_3 = c$	2	b
$D_4 = d$		
$D_5 = \lambda\lambda$		

$$c(x) = \begin{cases} 0, & x = 1 \\ 10, & x = 2 \\ 11, & x = 3 \end{cases}$$

$$n_0 = 0.5 \cdot 1 \cdot N + 0.125 \cdot 1 \cdot N$$

$$n_1 = 0.125 \cdot 2 \cdot N + 0.375 \cdot 2 \cdot N$$

$$p_0 = \frac{n_0}{n_0 + n_1} = 0.4\overline{16}$$

$$p_1 = \frac{n_1}{n_0 + n_1} = 0.583$$

$$H(z) = 0.98 \text{ bit/simb.}$$

1.

a) $I = H(y) - H(y|x)$

x \ y	-1	0	1	2
0	$\frac{p_0}{3}$	$\frac{p_0}{3}$	$\frac{p_0}{3}$	0
1	0	$\frac{(1-p_0)}{3}$	$\frac{(1-p_0)}{3}$	$\frac{(1-p_0)}{3}$
	$\frac{p_0}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{(1-p_0)}{3}$

$-\frac{p_0}{3}\log_2\frac{p_0}{3} - \frac{1}{3}\log_2\frac{1}{3} - \frac{1}{3}\log_2\frac{1}{3}$

$-\frac{1-p_0}{3}\log_2\frac{1-p_0}{3} + p_0\log_2\frac{1}{3} + (1-p_0)\log_2\frac{1}{3}$

$$H(y) = -\frac{1}{3}\left(p\log_2\frac{p}{3} + 2\log\frac{1}{3} + (1-p)\log_2\frac{(1-p)}{3}\right)$$

$$= -\frac{1}{3}\left(p\log_2 p - p\log_2 3 - 2\log_2 3 + (1-p)\log_2(1-p) - (1-p)\log_2 3\right)$$

$$= -\frac{1}{3}\left(-H(x) - p\log_2 3 - 2\log_2 3 - (1-p)\log_2 3\right)$$

$$= \frac{1}{3}H(x) + \frac{1}{3}p\log_2 3 + \frac{2}{3}\log_2 3 + \frac{1-p}{3}\log_2 3$$

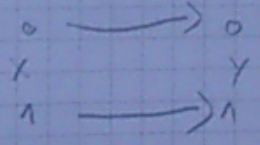
$$H(y|x) = -p\log_2\frac{1}{3} - (1-p)\log_2\frac{1}{3}$$

$$= p\log_2 3 + \log_2 3 - p\log_2 3$$

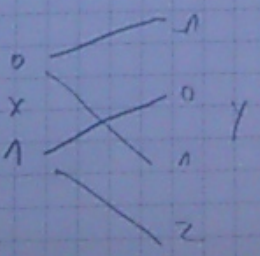
$$I = H(y) - H(y|x) = \frac{1}{3}H(x) + \log_2 3 - \log_2 3 = \frac{1}{3}H(x) \quad /'$$

$$C = \frac{1}{3}$$

b) $W = 0$



$W = 1$



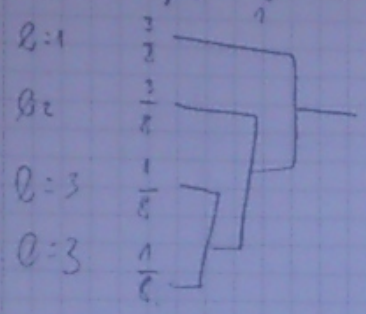
$$C = 1\cdot\frac{1}{3} + 1\cdot\frac{2}{3} = 1$$

3. a) $p_0 = \int_{-2}^{-1} f(x)\,dx = \frac{1}{8}$

$p_1 = \int_{-1}^{0} f(x)\,dx = \frac{3}{8}$

$p_2 = \int_{0}^{1} f(x)\,dx = \frac{3}{8}$

$p_3 = \int_{1}^{2} f(x)\,dx = \frac{1}{8}$



$L = \sum l_i p_i = 1.875\ bit$

b) $\Delta = 1$

$N_y = \int_{-2}^{-1} (x+1.5)^2 (0.5 + 0.25x)$

$+ \int_{-1}^{0} (x+0.5)^2 (0.5 + 0.25x)$

$+ \int_{0}^{1} (x-0.5)^2 (0.5 - 0.25x)$

$+ \int_{1}^{2} (x-1.5)^2 (0.5 - 0.25x)$

$= 0.023\ V^2$

- napak znanje

4. $G \times 20$

$(n-k) \times n$

$n = 20$

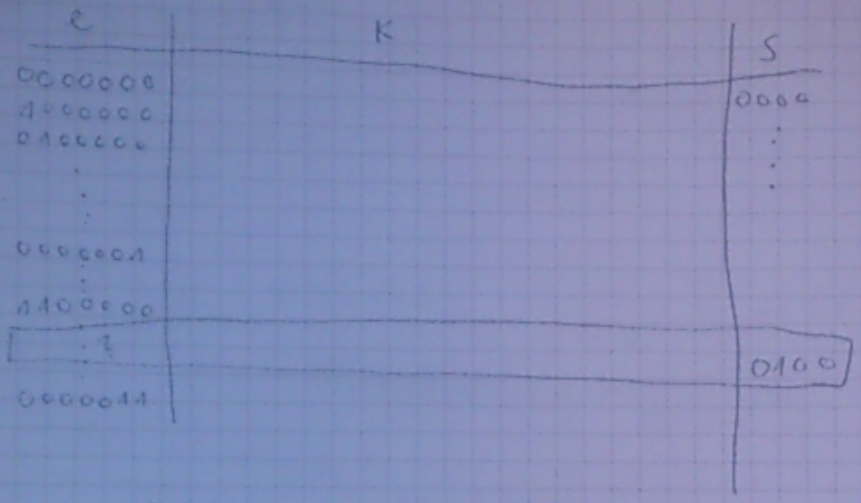
$k = 14$

$R = \frac{k}{n} = 0,7$

d = 4, npr

11000000000010100000

b)



$S = c' \cdot H^T = 0100$

$S = e \cdot H^T \Rightarrow e = c' \Rightarrow x = 00000000$

5. $H(\Sigma) = H(x) - (p_{m-1} + p_m) \log_2 (p_{m-1} + p_m) + p_{m-1} \log_2 p_{m-1}$

$= H(x) + p_m \log_2 \frac{p_m}{p_{m-1}+p_m} + p_{m-1} \log_2 \frac{p_{m-1}}{p_{m-1}+p_m} + p_m \log_2 p_m$

$= H(x) - (p_{m-1}+p_m) \left[- \frac{p_m}{p_{m-1}+p_m} \log_2 (1-1) - \frac{p_{m-1}}{p_{m-1}+p_m} \log_2 (1-1) \right]$

$= H(x) - (p_{m-1} + p_m) H(a, b)$