

Homework No. 7 Solutions

9.8 3.]

x_0, x_1, x_2	Code	L	$p(x_0, x_1, x_2)$
111	111	3	0.064
110	11-	2	0.096
101	1--	1	0.144 0.096
100	1-0	2	0.144
011	--100	2	0.096
010	---	0	0.144
001	-0-	1	0.144
000	-00	2	0.216

Prob 9.9

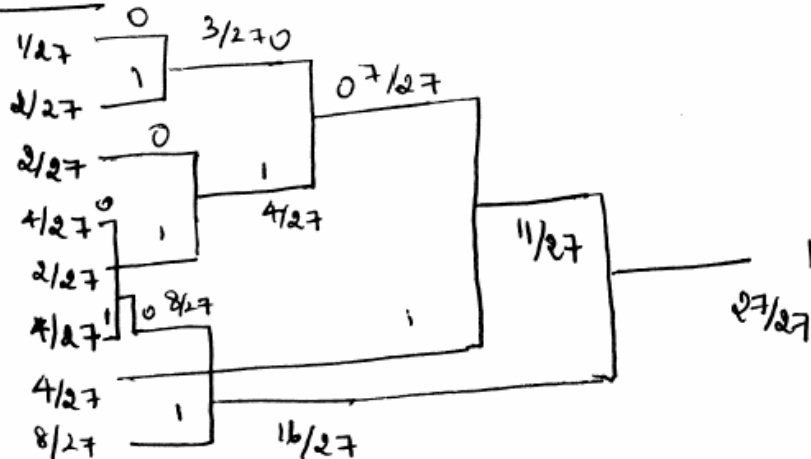
$P_r(x_n=1) = 2/3$, $P_r(x_n=0) = 1/3$.

Huffman code

x_0, x_1, x_2

000
001
010
011
100
101
110
111

Prob



codewords

0000
0001
0010
1000
0011
1010
0101
11

Avg. length = $\bar{L} = 2.851$ bits/symbol.

Entropy = $H(x) = \sum_{i=1}^k P_i \log(P_i)$

$H(x) = 2.75$

$\Rightarrow \bar{L} \geq H(x)$

9.10 4.1

Rep	Longest string	ENCODER Output Addr	Dictionary	Index	Pointer
1	1	10	0	0	1
2	0	01	10	1	2
3	11	110	01	2	3
4	10	111	110	3	4
5	010	1011	101	4	5
6	011	1001	111	5	6
7	00	10111	1011	6	7
8	101	101111	10111	7	8
9	1011	1011111	101111	8	9
10	10111	11011	11011	9	10
11	101111	101110	101110	10	11
12	110	00	00	11	12
13	101111	01111	01111	12	13
14	0	10	10	13	14
15	0111	09	09	14	15
16	101	10	10	15	16

Average length of the code depends on the dictionary.