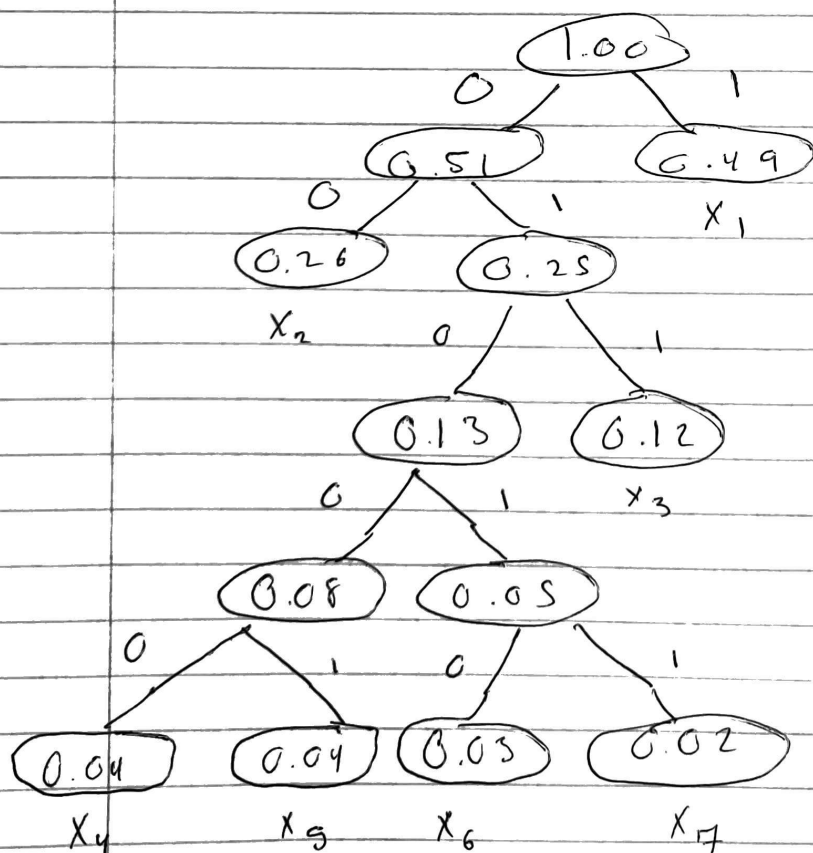


i)

Code word	X	Probability
1	$x_1$	0.49 — 0.49 — 0.49
00	$x_2$	0.26 — 0.26 — 0.26
011	$x_3$	0.12 — 0.12 — 0.12
01000	$x_4$	0.04 <del>0.05</del> 0.08
01001	$x_5$	0.04 <del>0.04</del> 0.05
01010	$x_6$	0.03 0.04
01011	$x_7$	0.02

$$\begin{array}{rcl}
 0.49 & - & 0.49 - 0.49 \times 0.51 > 1.00 \\
 0.26 & - & 0.26 - 0.26 \times 0.49 > 1.00 \\
 0.12 & \times & 0.13 = 0.25 \\
 0.08 & \times & 0.12 \\
 0.05 & & 
 \end{array}$$



2) Our encoding is

<u>Codeword</u>	<u>X</u>	<u>Probability</u>
1	$x_1$	0.49
00	$x_2$	0.26
011	$x_3$	0.12
01000	$x_4$	0.04
01001	$x_5$	0.04
01010	$x_6$	0.03
01011	$x_7$	0.02

Expected code length for this encoding is

$$\begin{aligned} & (1)(0.49) + (2)(0.26) + (3)(0.12) + (5)(0.04) \\ & + (5)(0.04) + (5)(0.03) + (5)(0.02) \\ & = 2.02 \end{aligned}$$

Expected code length for this encoding : 2.02

3)

Codeword	X	Probability			
2	$x_1$	0.49	-	0.49	- 0.49
1	$x_2$	0.26	-	0.26	- 0.26
02	$x_3$	0.12	-	0.12	0.25
00	$x_4$	0.04		0.09	
012	$x_5$	0.04		0.04	
011	$x_6$	0.03			
010	$x_7$	0.02			

