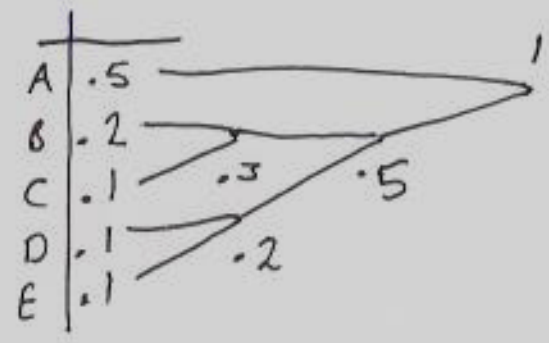


Q1
D=2

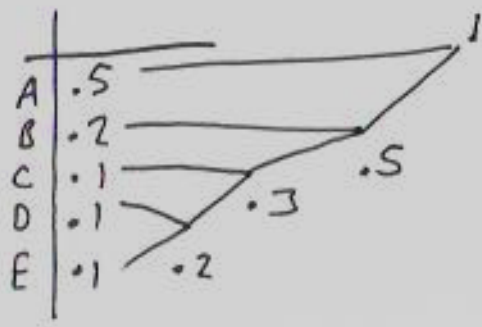


	Coin	Loss	prob
A	0	1	.5
B	100	3	.2
C	101	3	.1
D	110	3	.1
E	111	3	.1

$L =$
 $\{L_{coin} p_{coin} = .5 \times 1 + .5 \times 3$
 $= 2$

$H = .5 \log 2 - .2 \log .2 - .3 \log .1$
 $= 1.96$

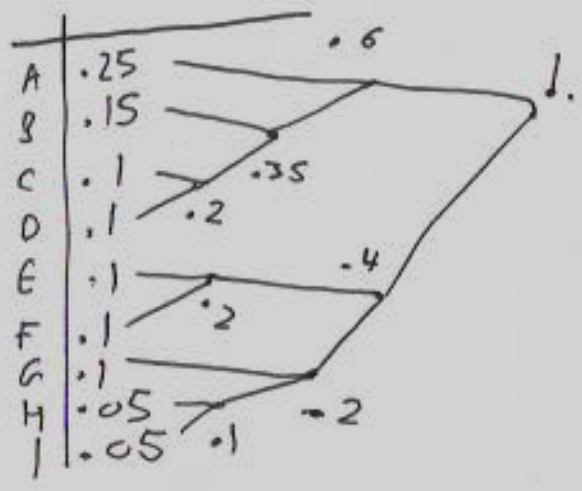
or, equally good



	prob	Coin	Loss
A	.5	0	1
B	.2	10	2
C	.1	110	3
D	.1	1110	4
E	.1	1111	4

$L = .5 + .2 \times 2 + .1 \times 3 + .2 \times 4$
 $= .5 + .4 + .3 + .8 = 2$
 again!

Q2
D=2

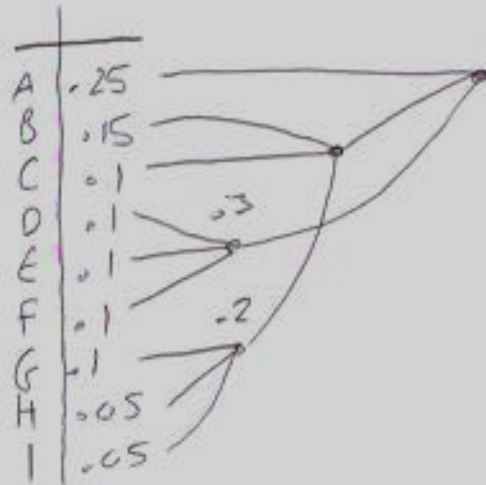


	prob	Coin	Loss
A	.25	00	2
B	.15	010	3
C	.1	0110	4
D	.1	0111	4
E	.1	100	3
F	.1	101	3
G	.1	110	3
H	.05	1110	4
I	.05	1111	4

$L = .25 \times 2 + .45 \times 3 + .3 \times 4$
 $= .5 + 1.35 + 1.2$
 $= 3.05$

$H = -.25 \log .25 - .15 \log .15$
 $+ .5 \times .1 \log .1 - 2 \times .05 \log .05$
 $= 3.$

D=3



x	p(x)	c(x)	l(x)
A	.25	0	1
B	.15	10	2
C	.1	11	2
D	.1	20	2
E	.1	21	2
F	.1	22	2
G	.1	120	3
H	.05	121	3
I	.05	122	3

$$1+2+2+2+2 \quad (2)$$

$$3 \quad 5 \quad 7 \quad 9$$

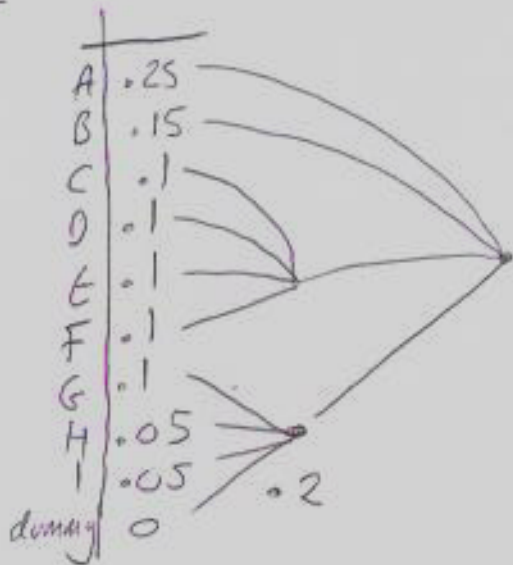
$$L = .25 + .15 \times 2$$

$$+ 4 \times .1 \times 2 + .1 \times 3$$

$$+ 2 \times .05 \times 3$$

$$= 1.95$$

D=4



x	p(x)	c(x)	l(x)
A	.25	0	1
B	.15	1	1
C	.1	20	2
D	.1	21	2
E	.1	22	2
F	.1	23	2
G	.1	30	2
H	.05	31	2
I	.05	32	2

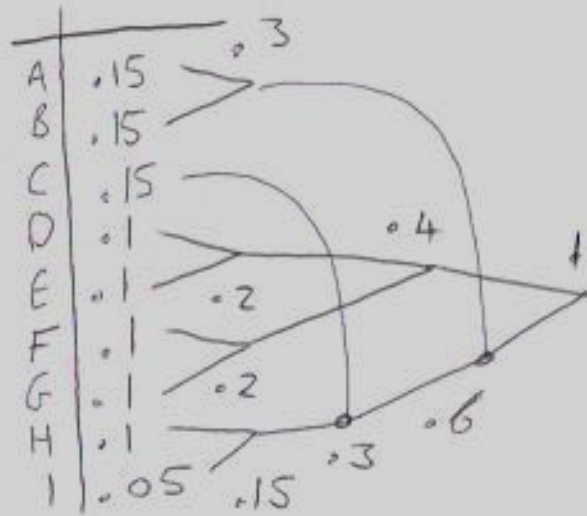
$$L = .4 + .6 \times 2$$

$$= 1.6$$

1 4 7 10

Q3

$D=2$



x	prob	code	len
A	.15	100	3
B	.15	101	3
C	.15	110	3
D	.1	000	3
E	.1	001	3
F	.1	010	3
G	.1	011	3
H	.1	1110	4
I	.05	1111	4

(3)

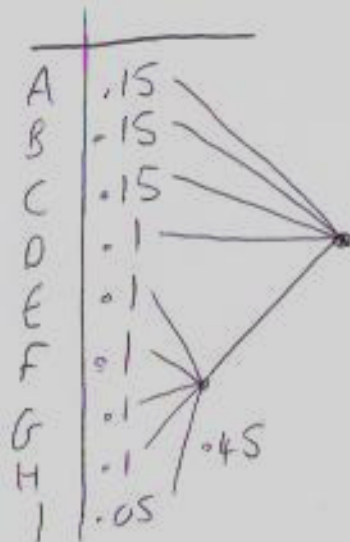
$$L = 0.85 \times 3 + 0.15 \times 4 = 3.15$$

$$H = -3 \times 0.15 \log_2 0.15 - 5 \times 0.1 \log_2 0.1 - 0.05 \log_2 0.05 = 3.11$$

$D=5$

$(1+k(D-1))$

1, 5, 9



x	prob	code	len
A	.15	0	1
B	.15	1	1
C	.15	2	1
D	.1	3	1
E	.1	40	2
F	.1	50 41	2
G	.1	60 42	2
H	.1	43	2
I	.05	44	2

$$L = 0.55 + 0.45 \times 2 = 1.45$$