Partiel 2016-2017

Wednesday, October 29, 2025 10:53 AM

Exercise 1:

a- $\frac{4 \times 8 + 8 + 8}{4} = 12$ bits

b- $\frac{old}{new} = 4$

$\Rightarrow \frac{720 \times 576 \times 12}{720 \times 576 \times X} = 4$

$\Rightarrow X = \frac{12}{4} = 3$ bits

c- size of a 6 min video:

$6 \times 60 \times 720 \times 576 \times 12 \times 25$

$\Rightarrow 4.478976 \times 10^6$

$\Rightarrow \frac{4.478976 \times 10^6}{10 \times 10^6}$

10×10^6

$= 4478$ seconds

d- size of 6min of Y (luminance)

$= 6 \times 60 \times 720 \times 576 \times 8 \times 25$ (8 for Y)

$= 2.985984 \times 10^{10}$

* size of 6min of U (each 4p are 1 p (2/4))

$= 6 \times 60 \times 360 \times 576 \times 25 \times \frac{2}{4}$

$= 3\,732\,480\,000$

* size of 6min of V

$= 3.73248 \times 10^9$

* Total = Y + U + V

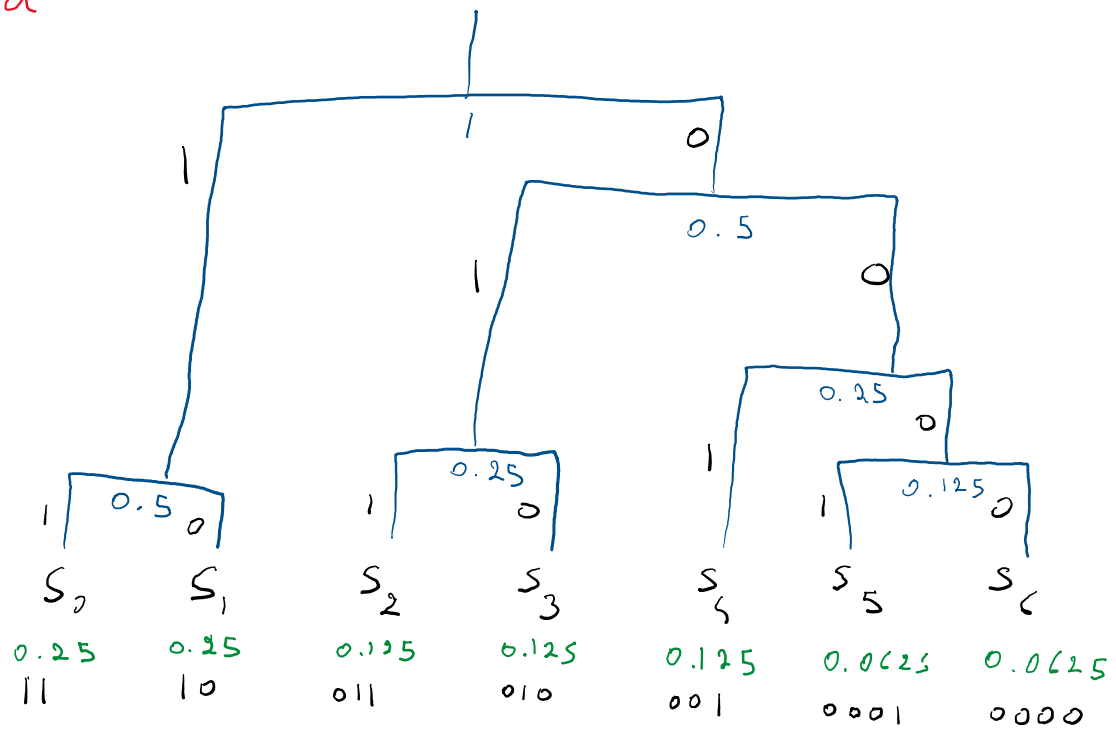
$= 3.73248 \times 10^{10}$

Exercise 2 :

a -

1

a -



b - avg bits per symbol $= 2 \times 0.25 + 2 \times 0.25 + 3 \times 0.125 + \dots$

$= 2.625$ bits/symbol

Entropy: $H = -\sum p_i \log(p_i)$

$= 2.625$ bits/symbol

$$\text{Efficiency} = \frac{2.625}{2.625} = 100\%$$

c - $CF = \frac{\text{original}}{\text{compressed}} = \frac{300 \times 8}{300 \times 2.625}$

(compression factor)

$\approx 3.05 \Rightarrow \underline{3.05:1}$

Jaciel

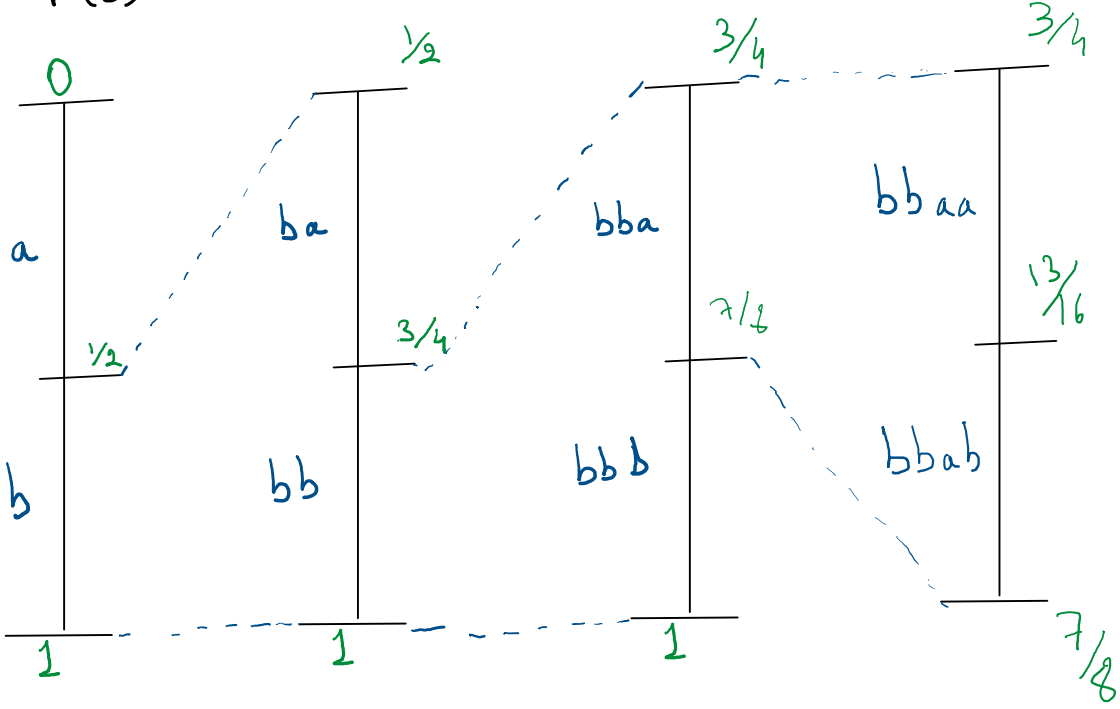
$\simeq 3.05 \Rightarrow 3.05:1$

Exercise 3:

a) $P(a) = 0.5$

$P(b) = 0.5$

seq = bbaa



$\Rightarrow [0.75, 0.8125[$

$2^{-1} + 2^{-2} = 0.75$

inside the interval

→ 11

b-

Symbol	code
a	96
b	97
⋮	
256	aa
257	aaa
258	aaaa
259	aaaab

96 96 256 256 258 97 259
a a aa aa aaaa b aaaab

Exercise 4:

$2^4 = 16$ values

4 bits for differences $\Rightarrow 2^4 = 16$ values

$\Rightarrow [-8, 7]$

seq:	123	120	117	132	130	100	105	110	112	107
diff:	123	-3	-3	15	-2	-30	5	5	2	-5
qualized:	123	-3	-3	7	-2	-8	5	5	2	-5
sent:	123	-3	-3	7	6	-8	-8	-4	2	-5
received:	123	120	117	124	130	122	114	110	112	107