

LOGIC REVIEW BEFORE MIDTERM EXAM

a b c d e f g h i j k l m n o p q r s t u v w x y z

q1 a w b ? c o

Q2 e e z ? y o o

Exercise 2:

Q1 An ASCII represents 245 characters. What is the size (in bits) of an ASCII? (*Justify your answer*)

Q2 with 8 bytes, how many values can be represented? (*Justify your answer*)

Q3 How many bits to store alphabet and number in keyboard 0...9, A...Z and a...z

Exercise 3:

Q1 What is the result of this operation with binary numbers?

$$\begin{array}{r} 1011 \ 0101 \\ - \ 0101 \ 1110 \\ \hline 1010111 \end{array}$$

Q2 What is the result of this operation with binary numbers?

$$\begin{array}{r} 1111 \ 0011 \\ - \ 1111 \ 1101 \\ - \ 0111 \ 1011 \\ \hline 1110001 \end{array}$$

Q3 What is the result of this operation with binary numbers?

$$\begin{array}{r} 1011 \ 0011 \\ - \ 0101 \ 1101 \\ - \ 0111 \ 1011 \\ - \ 0101 \ 1000 \\ \hline 1011 \end{array}$$

Q4 What is the result of this operation with binary numbers?

$$\begin{array}{r} 1011 \ 0101 \\ + \ 0111 \ 1111 \\ \hline 100110100 \end{array}$$

Q5 What is the result of this operation with binary numbers?

$$\begin{array}{r} 1111 \ 0011 \\ + \ 1001 \ 1101 \\ + \ 0111 \ 1011 \\ \hline 1000001011 \end{array}$$

Q6 What is the result of this operation with hexadecimal numbers?

$$\begin{array}{r} D2F7 \rightarrow 13 \ 2 \ 15 \ 7 \\ + \ CF84 \rightarrow 12 \ 15 \ 8 \ 4 \\ + \ 3CDE \rightarrow 3 \ 12 \ 13 \ 14 \\ \hline 1DF59 \end{array} \Rightarrow \begin{array}{r} 1101 \ 0010 \ 1111 \ 0111 \\ 1100 \ 1111 \ 1000 \ 0100 \\ 0011 \ 1100 \ 1101 \ 1110 \\ \hline 11101111101011001 \end{array} +$$

Exercise 4:

Compute the following conversions

Base 2	Base 10
101101	<i>Explanation:</i> 55

Base 2	Base 16
101101	<i>Explanation:</i> 2D

Base 16	Base 8
D8F	<i>Explanation:</i> 6615

Base 16	Base 2
D8F	<i>Explanation:</i> 1101 1000 1111

Exercise 5:

Q1. Rules:

- First 3 characters "AOU", repeated many times (max repetition is 20)
- In the end you can have X, Y or Z, only one letter

Examples:

AOUAOUX
AOUY
AOUAOUAOUAOUX

- a) Explain your encoding
- b) Give examples
- c) Explain the size

Q2. Rules:

- 3 signs: @, #, %
- The sign is any order
- Each sign is repeated the same number of times, maximum of repetition is 5
- In the end you can have A, B or C, only one letter

Examples:

@@####A
%%@@@@@#B

- d) Explain your encoding, give the example and your explanation
- e) For this example, %%%%%%%%%C, what is the littlest size possible with your encoding?
- f) Explain the size

EXERCICE 6: Encoding problem

Rules:

- 4 letters: A, B, C, D
- Any order
- Maximum of repetition is 14

Examples:

ABCD
DBCAA
ADABCAA

- g) Explain your encoding
- h) Give examples
- i) Explain the size

EXERCICE 7: Encoding problem

Rules:

- First 2 characters "AB", repeated many times (max repetition is 5)
- Then 1 character "*", repeated many times (max repetition is 5)
- Then 1 number (0-9)

Examples:

ABABAB***8
 AB*****7
 ABABAB*****3

- j) Explain your encoding
- k) Give examples
- l) Explain the size

EXERCICE 8: Encoding problem

Rules:

- 4 letters: A, E, O, U
- Each letter is repeated minimum 0 time and maximum 7 times.
- The letters are always in the alphabetic order: A then E then O then U

Examples:

AAAAEEEEOUU
 EEEUUUUUUU
 AAEEEEOUU

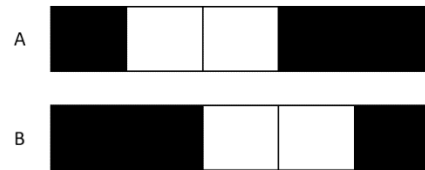
- a) Find an encoding of maximum **12 bits**. Explain the method, explain the size and give examples.
- b) Is your encoding lossless or loosely?

EXERCICE 9: Encoding problem

Rules:

- The image has only 2 options A & B

Question - Find an encoding

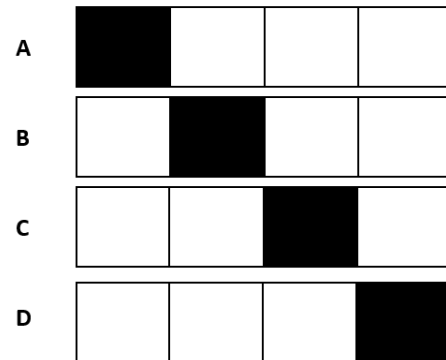


EXERCICE 10: Encoding problem

Rules:

- The image has only 4 options A, B, C, D

Question - Find an encoding

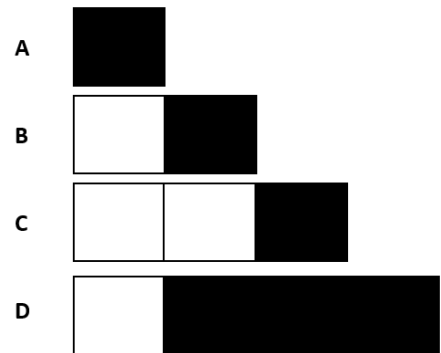


EXERCICE 10: Encoding problem

Rules:

- The image has 1 to 4 pixels
- 1 to 3 black pixels
- The black pixels shall be together

Question - Find an encoding



More ...

EXERCICE 11: Encoding problem

Rules:

- The white pixels have 0 to 2
- Black pixel always first and last cells

Question - Find an encoding

