HOMEWORK

LOGIC REVIEW BEFORE MIDTERM EXAM

Exercise 1:

The alphabet is given below to help you:

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?

```
    1011 0101
-   0101 1110
_____________
```

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

```
    1111 0011
-   1111 1101
-   0111 1011
_____________
```

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

```
    1011 0011
-   0101 1101
-   0111 1011
-   0101 1000
_____________
```

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

```
    1011 0101
+   0111 1111
_____________
```

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

```
    1111 0011
+   1001 1101
+   0111 1011
_____________
```

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

```
    D2F7
+   CF84
+   3CDE
_________
```

Exercise 4:

Compute the following conversions

Base 2	Base 10
101101	*Explanation:*

Base 2	Base 16
101101	*Explanation:*

Base 16	Base 8
D8F	*Explanation*:

Base 16	Base 2
D8F	*Explanation*:

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:

AAAAEEEOOU
EEEUUUUUUU
AAEEOOUU

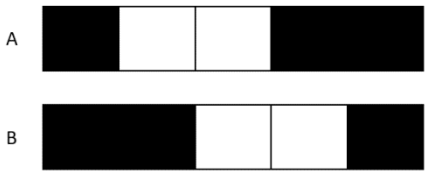
a) Find an encoding of maximum **12 bits**. Explain the method, explain the size and give examples.
b) Is your encoding lossless or loosely?

EXERCICE 9: Encoding problem

Rules:

- The image has only 2 options A & B

Question - Find an encoding

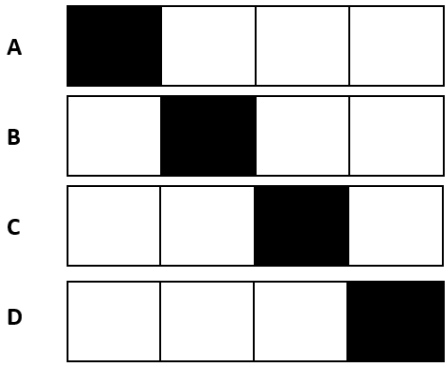


EXERCICE 10: Encoding problem

Rules:

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

Question - Find an encoding

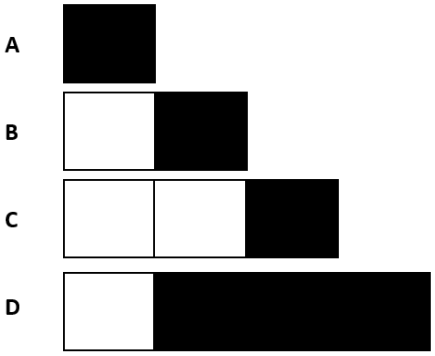


EXERCICE 10: Encoding problem

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