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Institutt: IDI
Eksamensoppgave i IFUD1056 Python for Programmers
Faglig kontakt under eksamen:

- Ali Alsam 46793421
- Donn Morrison 45548895

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Hjelpemeiddelkode/Tillatte hjelpemidler: Alle hjelpemiddler tillatt
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1 Task 1 - Key-value store

Key-value store

A key-value store is a type of database which uses associative arrays to store and index information.

Task

1. Implement a class KVStore
2. The __init__() constructor should initialise the KV store to be empty
3. Implement the following methods:
    1. insert(key, value)
    2. get(key)
    3. set(key, value)
    4. delete(key)
4. In addition, the KVStore class should be iterable:
    1. __iter__()
    2. next() (or __next__() in Python3)

KVStore should support saving objects. You may use any internal datastructure you wish.

Example usage:

```
db = KVStore() # Create and initialise a new kv-store
obj = MyObject() # Arbitrary object (can be any data type)

db.insert("name", "Rick Astley")
db.insert("object", obj)

name = db.get("name")

# Iteration
for key, value in db:
    print(key, ":", value)

db.delete("object")
```

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Maks poeng: 100

2 Task 2 - Element-wise matrix multiplication

Matrix multiplication by Hadamard product

Write a function that takes two 2-dimensional arrays a, b, and returns the matrix multiplication by Hadamard product in a new 2-dimensional array x.

Hadamard product: $x_{(i,j)} = a_{(i,j)} * b_{(i,j)}$

For any resulting value x(i,j) > 255, set x(i,j) = 255.

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Maks poeng: 10

3 Task 3 - String capitalisation

String manipulation

Let one of two inputs to a function be any string, e.g. ‘Hello World!’
Let the second input be a vector whose elements are zeros and ones e.g. (0010111).
Write a function that changes the case, upper or lower, of letters in the first string based on the value of the associated element in the input vector. Specifically, the i^{th} letter should be upper case when the i^{th} element of the binary vector is one.
As an example, given the string ‘Python’ and a binary vector ‘010’, the function should return a new string ‘pYthOn’.
The function should count blank spaces, numbers and special characters without changing them.
Finally, if the binary vector is shorter than the input string then it should be replicated, i.e. 01 becomes 01+01=0101. On the other hand, if the vector is shorter than the string it should be truncated.

Skriv ditt svar her...

```
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Maks poeng: 10