Devoir sur table

Python Libs 4 Sciences - 2025

Student name: (First name *then* FAMILY NAME)

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Expected answers in *FRENCH* or in *ENGLISH*.

Operating System : (5 points)

1. **What is a terminal (or shell) ?** *(only one response)*
   ◯ A kernel (Noyau in french) of an Operating System
   ◯ A machine/computer
   ◯ A text interface to the system
   ◯ A file browser

2. **Which of the following are functions or roles of an Operating System (OS)?**
   (one or several answers accepted)
   ☐ Managing hardware resources (CPU, memory, devices)
   ☐ Providing a user interface (CLI or GUI)
   ☐ Running application software
   ☐ Translating high-level programming languages
   ☐ Managing files and storage
   ☐ Controlling access and security
   ☐ Designing network protocols

3. **Which pair of commands would: show all running processes, and stop the process with PID 1234?** *(only one response)*
   ◯ `ls -l` and `rm 1234`
   ◯ `top` and `exit 1234`
   ◯ `ps aux` and `kill 1234`
   ◯ `who` and `shutdown 1234`

4. **What do** `drwxr-xr-x` **and** `-rw-r-----` **mean in the output of the** `ls -lah` **command ?**
   Sample from the command output on \etc :

   ```
   ...
   drwxr-xr-x  2 root root   4,0K juin  28 07:26 sensors.d
   -rw-r--r--  1 root root    13K mars  27  2021 services
   drwxr-xr-x  3 root root   4,0K sept.  5 10:49 sgml
   -rw-r-----  1 root shadow 1,5K juil. 10 10:42 shadow
   ...
   ```

Basic Programming : (7 points)

1. **Write a function that returns the element in a list that are closest to a given value.**
   Example: For the value 5 and the list [1, -50, 12, 4, 7, 6.6], the function should return the element(s) closest to 5.

2. **What is the output of the following code ?**
   (the main idea is accepted if you cannot provide the exact output)

```python
def generateData(n=100):
    data= [ x for x in range(n) ]

generateData(5)
print( data )
```

3. **Example code:**

Write a short script that prints a random choice (for instance between 1, 34, and -10). The random package in *Python* provides the function choice(), which returns a randomly selected element from a given list, for example choice(aList).

4. **What is the 2 outputs of the following code ?**
   (the main idea is accepted if you cannot provide the exact output)

```python
class aClass:

    def __init__(self):
        self._anAttribute= 0

    def setAttribute(self, aValue):
        self._anAttribute= aValue
        return self

    def attribute(self):
        return self._anAttribute

anInstance= aClass()
anInstance.setAttribute(23)

print( anInstance.attribute() )
print( anInstance )
```

Develloper tools : (3 points)

1. **Which of the following best describes version control ?** *(only one response)*
   ○ A system for editing text files
   ○ A system for tracking and managing changes
   ○ A programming language for evolving application
   ○ A type of operating system with numbered version.

2. **Connect the git commands to their definitions**

```
push      o                          o copies localy a remote repository

commit    o                          o gets new elements from a remote repository

pull      o                          o records changes to the repository

clone     o                          o updates remote repository with the local changes
```

3. **Which of the following statements are true about Test-Driven Development (TDD) ?**
   (one or several answers accepted)
   ☐ You write tests before writing the code to implement functionality
   ☐ TDD encourages implementing completely functionality and to test later
   ☐ TDD helps to catch bugs early
   ☐ TDD is only used for UI development.

4. **Pytest Example:**

Provide a complete short pytest script that test a `sum` function in our `myPkg` package. The `sum` function takes a list of numerical values as parameters (integer and/or floating point numbers) and return the sum of these values. I wan that my test script tests several valid configurations (i.e. several and different lists of numbers).

Librairies and data sciences : (10 points)

1. **What is an ``epoch'' when training a neural network? Why is it useful to have more than one?**

2. **In the following code:**

```
X_train, X_test, y_train, y_test = train_test_split( iris.data, iris.target,
    test_size=0.3, random_state=1, shuffle=True, stratify=iris.target )
```

what is the train and test split? What is the result of this and why is it mandatory to do it?

3. **In some examples you could have seen that we use also a validation set. What is it and in what case is it used?**

4. **What is a confusion matrix? How is it used and what does it represent?**

5. **What is a dataframe and why is it better for data science than a python list?**