

Python for ML Mid Term

100 Marks Deadline: 26th October, 11:59 PM

90 Marks Deadline: 28th October, 11:59 PM

Submission Instructions:

1. Watch the assignment instruction video carefully before starting.
2. Create a **Google Colaboratory (.ipynb)** file in your Google Drive.
3. **Make Text Cell and give the following information:**
Your registered email address (the one used for your Phitron account).
4. Write all answers for all questions in a **single file**.
5. For each question, create a **Text cell** with the question number and a **Code cell** with your solution.
6. Print or display all required outputs clearly so that graders can verify results.
7. Share the Colab file with “**Anyone with the link**” and permission set to “**Viewer**”.
8. Submit only the Colab link.

Note: Each Question is carrying 10 marks.

0) Starter Code (Run First)

You must run this code and use that data set for all the questions

```
import numpy as np
import pandas as pd

np.random.seed(42)

ids = np.arange(1, 11)
ages = np.random.randint(18, 60, 10)
salaries = np.random.randint(30000, 90000, 10)
departments = np.array(["HR", "IT", "Finance", "IT", "HR", "Sales", "Finance", "IT", "Sales", "HR"])

DF = pd.DataFrame({
    "id": ids,
    "age": ages,
    "salary": salaries,
    "dept": departments
})

DF.to_csv("employees.csv", index=False)
print("Sample Data Created and Saved as employees.csv")
```

1) NumPy — 5 Questions

Q1. Create NumPy arrays from the **ages** and **salaries** data generated above. Print both arrays and display their **dtype**, **ndim**, **shape**, and **size**.

- Q2.** Using the `salaries` array, find and print the highest and lowest salary values. Also, calculate and print the average salary and age using NumPy functions.
- Q3.** From the `ages` array, filter and print all ages greater than 30 using a boolean condition. Then count and print how many employees are older than 30.
- Q4.** Create a new NumPy array that increases every employee's age by 5 years (without modifying the original array). Print the new updated ages array.
- Q5.** Using NumPy, calculate the total salary expense (sum of all salaries) and the difference between the maximum and minimum salary. Print both results.
-

2) Pandas — 5 Questions

- Q6.** Load the `employees.csv` file into a Pandas DataFrame. Display the first 5 rows, and check basic info using `info()` and summary statistics using `describe()`.
- Q7.** Display only the `id`, `age`, and `salary` columns. Then show the last 3 rows using `tail()`.
- Q8.** Filter the DataFrame to show only employees who work in the `IT` department. Print the result and show the total number of IT employees.
- Q9.** Sort the DataFrame by `salary` in descending order and display the top 3 highest-paid employees along with their department and age.
- Q10.** Replace all `salary` values greater than 80000 with 80000 using `loc`. Then calculate and print the new average salary of all employees after replacement.