session 3 (Exercises Series 2)

1.Multiples of 3 or 5 (مضرب 3 یا 5)

`قراردادن کامنت برای همه خطوط کد الزامی است. (هر خط کامنت را هم از نظر برنامه نویسی و هم به صورت مفهومی توضیح دهید.)`

`Commenting is required for all lines of code. (Explain each comment line in both programming and conceptual terms. An example is provided.)`

Problem Statement(بیان مسئله):

لیستی از اعداد مثبت کمتر از 1000 ایجاد کنید به طوری که تمام مقادیر موجود در لیست مضرب 3 یا 5 باشند. مجموع تمامی مقادیر آن لیست را چاپ کنید

Create a list of positive numbers less than 1000 such that all values in the list are multiples of 3 or 5. Print the sum of all values in that list.

Hint(راهنمایی):

```
a = 13
```

```
b = 6
```

```
c = a % b
```

```
print(a, "mod", b, "=",c, sep=" ")
```

```
output: 13 mod 6 = 1
```

To understand this example, you should have the knowledge of the following Python programming topics:

- 0. Python Basic Output
- 1. Variables and Data Types
- 3. Conditionals (if, elif, else)
- 4. Loops
- 5. Functions
- 6. Lists

In [ ]:
```python
def generate_multiples(limit, multiples):
    """
    Generate a list of numbers less than 'limit' that are multiples of the given 'multiples'.

    ...

    """

    ...

    return result  # Return the list of multiples.


def main():
    limit = 1000  # ...
    multiples = [3, 5]  # ...

    numbers = generate_multiples(limit, multiples)  # ...
    total_sum = 0  # ...

    ...

    print(f"Numbers less than {limit} that are multiples of {multiples}:")
    print(numbers)  # Display the list of multiples.
    print(f"\nThe sum of these numbers is: {total_sum}")  # Display the sum.


if __name__ == "__main__":  # Ensure the script runs only when executed directly.
    main()  # Run the main function.
```

2.Manual Matrix Transposition (انتقال ماتریس به صورت دستی)

`Commenting is required for all lines of code.`

Problem Statement:

یک برنامه پایتون بنویسید که یک ماتریس

10×10

را به صورت دستی بدون استفاده از توابع داخلی مثل

.T یا .transpose()

از کتابخانه‌ی نامپای به حالت ترانهاده تبدیل کند

Write a Python program to manually transpose a `10×10` matrix `without` using any built-in transposition functions like `.T` or `.transpose()` from the `NumPy` library.

To understand this example, you should have the knowledge of the following Python programming topics:

- 0. Python Basic Output
- 1. Variables and Data Types
- 2. Taking Input from the User
- 4. Loops
- 8. Matrices
- 9. Using `NumPy`

In [ ]:
```python
import numpy as np

original_matrix = np.random.randint(1, 101, size=(10, 10))# Generate a 10x10 matrix with random integers between 1 and 100


...


# Print the original and transposed matrices
print("Original Matrix:")
print(original_matrix)

print("\nTransposed Matrix:")
print(transposed_matrix)
```

In [ ]:
```python

```

In [ ]:
```python

```