Birla Institute of Technology & Science, Pilani

Work-Integrated Learning Programmes Division

MTech in Data Science & Engineering / Artificial Intelligence and Machine Learning

S1_2024-2025, DSECLPFDS/AIMLCPFDS

Python Exercises for Practice (Topics of S1 and S2)

The below exercises are only for practice. You are NOT required to submit its solutions for evaluation as this is an audit course. Nevertheless, you may post your solution file in Question/Answer Forum and get your solutions peer reviewed.

1. **Write a Python function to find the factorial of a number using recursion.**
    - **Description:** The factorial of a number n is the product of all positive integers less than or equal to n.
    - **Example Input:** 5
    - **Example Output:** 120
2. **Given two lists, write a Python function to find the intersection (common elements) of the lists.**
    - **Description:** The function should return a list of elements that appear in both input lists.
    - **Example Input:** [1, 2, 3, 4] and [3, 4, 5, 6]
    - **Example Output:** [3, 4]
3. **Write a Python program to count the frequency of each element in a list.**
    - **Description:** Given a list of elements, return a dictionary where the keys are elements and the values are their frequencies.
    - **Example Input:** [1, 2, 2, 3, 3, 3, 4]
    - **Example Output:** {1: 1, 2: 2, 3: 3, 4: 1}
4. **Write a Python program to remove duplicates from a list while preserving the original order.**

- **Description:** Given a list, return a new list with all duplicate elements removed, keeping only the first occurrence of each element.
- **Example Input:** [1, 2, 2, 3, 4, 3]
- **Example Output:** [1, 2, 3, 4]

5. **Write a Python function to calculate nCr (binomial coefficient) using the formula nCr=n!r!(n−r)!nCr = \frac{n!}{r!(n-r)!}nCr=r!(n−r)!n!.**
   - **Description:** Given integers n and r, calculate the value of nCr.
   - **Example Input:** n = 5, r = 3
   - **Example Output:** 10
6. **Write a Python function that takes a string as input and returns the string reversed.**
   - **Example Input:** "hello"
   - **Example Output:** "olleh"
7. **Write a Python program to check if a given year is a leap year or not.**
   - **Description:** A year is a leap year if it is divisible by 4, except for years that are divisible by 100, unless they are also divisible by 400.
   - **Example Input:** 2020
   - **Example Output:** True
8. **Write a Python function to count the number of vowels in a given string.**
   - **Example Input:** "hello world"
   - **Example Output:** 3
9. **Write a Python function that takes a list of integers and returns a tuple containing the maximum and minimum values from the list.**
   - **Example Input: [1, 2, 3, 4, 5]**
   - **Example Output: (5, 1)**
10. **Write a Python function that takes a list of integers and returns the sum of all the even numbers in the list.**
    - **Example Input: [1, 2, 3, 4, 5]**
    - **Example Output: 6**
11. **Write a Python function that takes a list of integers and returns the second largest element in the list. If there is no second largest, return None.**
    - **Example Input: [1, 2, 3, 4, 5]**
    - **Example Output: 4**
    - **Example Input: [5, 5, 5]**
    - **Example Output: None**

12. **Write a Python function that removes all whitespace characters (spaces, tabs, etc.) from a string.**
    - **Example Input: "hello world"**
    - **Example Output: helloworld**

13. **Write a Python function that takes a string and returns the length of the longest word in the string.**
    - **Example Input: "The quick brown fox"**
    - **Example Output: 5**

14. **Write a Python function that prints the multiplication table for a given number from 1 to 10.**
    - **Example Input: 3**
    - **Example Output:**

      # 3 x 1 = 3
      # 3 x 2 = 6
      # 3 x 3 = 9
      # ...
      # 3 x 10 = 30

15. **Write a Python function that prints all prime numbers between start and end (inclusive).**
    - **Example Input: 10, 20**
    - **Example Output: 11, 13, 17, 19**

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