Assignment No 2

I. Sets (5 Questions)

1. Create a set with numbers from 1 to 5. Add the number 6 and remove 3. Print the final set.
2. Write a program to find the **union** and **intersection** of two sets: `{1, 2, 3}` and `{3, 4, 5}`.
3. Given a list with duplicates `[1, 2, 2, 3, 4, 4, 5]`, convert it into a set to remove duplicates.
4. Check whether the number 7 exists in the set `{1, 3, 5, 7, 9}`.
5. Create two sets and print the **symmetric difference** between them.

II. Dictionaries (5 Questions)

6. Create a dictionary of 3 students with names as keys and marks as values. Print only the keys.
7. Given `{"a": 1, "b": 2, "c": 3}`, update the value of `"b"` to `5`.
8. Write a program to count character frequency in the string `"hello world"` and store it in a dictionary.
9. Merge two dictionaries: `{"x": 10, "y": 20}` and `{"y": 30, "z": 40}`.
10. Check if a given key exists in a dictionary. If not, add the key with a default value.

III. Functions (10 Questions)

11. Write a function `greet()` that prints `"Hello, Python!"`.
12. Create a function `square(n)` that returns the square of a number.
13. Write a function to calculate the **sum** of all elements in a list.
14. Create a function with a default parameter: `def welcome(name="Guest")`. Print `"Welcome, <name>!"`.
15. Write a function `is_even(num)` that returns `True` if a number is even, else `False`.
16. Create a function to calculate the factorial of a number using recursion.
17. Write a function `max_of_three(a, b, c)` that returns the largest of three numbers.
18. Create a function `reverse_string(s)` that returns the reversed string.
19. Write a function to count the number of vowels in a given string.
20. Create a function that accepts any number of arguments using `*args` and returns their sum.

IV. Loops (10 Questions)

21. Print numbers from 1 to 10 using a `for` loop.
22. Print the multiplication table of `5` using a loop.
23. Given a list `[10, 20, 30, 40]`, print each element using a loop.
24. Write a program to find the sum of numbers from 1 to 100 using a `for` loop.
25. Print only even numbers from 1 to 20 using a loop.
26. Given a string `"python"`, print each character using a loop.
27. Find the factorial of `n` using a `for` loop.
28. Print the reverse of a list `[1, 2, 3, 4, 5]` using a loop.
29. Count and print the number of odd numbers between 1 and 50.
30. Given a list of integers, print only the positive numbers using a loop.

V. While Loops (10 Questions)

31. Print numbers from 1 to 10 using a `while` loop.
32. Calculate the sum of digits of a number using a `while` loop.
33. Reverse a number using a `while` loop.
34. Keep taking user input until they enter `"exit"`.
35. Print the multiplication table of a given number using a `while` loop.
36. Print the first 10 even numbers using a `while` loop.
37. Find the factorial of a number using a `while` loop.
38. Count the number of digits in a number using a `while` loop.
39. Print the Fibonacci sequence up to `n` terms using a `while` loop.
40. Keep asking for a password until the user enters `"python123"`.

VI. Conditional Statements (10 Questions)

41. Check if a given number is positive, negative, or zero.
42. Input a year and check if it's a leap year.
43. Input a character and check if it's a vowel or consonant.
44. Write a program to check if a number is divisible by both 3 and 5.
45. Input age and print whether the person is eligible to vote (18 or above).
46. Given three numbers, print the largest one.
47. Input a mark and print the grade:

- 90+: A
- 75–89: B
- 60–74: C
- Else: F

48. Check if a string is a palindrome.
49. Given a number, check if it is **even** or **odd** using conditional statements.
50. Take two numbers and a choice from the user. If the choice is `"add"`, print sum; if `"sub"`, print difference; else print `"Invalid choice"`.

VII. Operators (15 Questions)

A. Arithmetic Operators (5 Questions)

51. Input two numbers and print their sum, difference, product, quotient, and remainder.
52. Given `a = 2`, `b = 5`, print `a ** b`.
53. Find the area of a circle given its radius ($\pi = 3.14$).
54. Input marks of 5 subjects and print their **average**.
55. Convert temperature from Celsius to Fahrenheit.

B. Bitwise Operators (5 Questions)

56. For `a = 5` and `b = 3`, print results of `a & b`, `a | b`, and `a ^ b`.
57. Shift bits of `x = 8` to the left by 2 positions and print the result.
58. Check whether a given number is even using bitwise operators.
59. Swap two numbers using bitwise XOR.
60. Demonstrate bitwise NOT on an integer and explain the output.

C. Conditional (Ternary) Operators (5 Questions)

61. Input two numbers and print the greater one using a ternary operator.
62. Print `"even"` if a number is divisible by 2, else print `"odd"`.
63. Assign `"Pass"` or `"Fail"` to a variable based on marks ≥ 40 using a single line.
64. Input three numbers and print the smallest using a ternary operator.
65. Check if a character is uppercase or lowercase in one line.