

# 1. Syntax and Semantics

**Question 1:** Write a Python program to print "Hello, World!".

```
# Solution
print("Hello, World!")

Hello, World!
```

**Question 2:** Write a Python program that takes a user input and prints it.

```
# Solution
user_input = input("Please enter something: ")
print(f"You entered: {user_input}")

Please enter something: Hello User!
You entered: Hello User!
```

**Question 3:** Write a Python program to check if a number is positive, negative, or zero.

```
# Solution
number = float(input("Enter a number: "))
if number > 0:
    print("The number is positive.")
elif number < 0:
    print("The number is negative.")
else:
    print("The number is zero.")

Enter a number: 2
The number is positive.
```

**Question 4:** Write a Python program to find the largest of three numbers.

```
# Solution
num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))
num3 = float(input("Enter third number: "))

if (num1 >= num2) and (num1 >= num3):
    largest = num1
elif (num2 >= num1) and (num2 >= num3):
    largest = num2
else:
    largest = num3

print(f"The largest number is {largest}")
```

```
Enter first number: 6
Enter second number: 3
Enter third number: 2
The largest number is 6.0
```

**Question 5:** Write a Python program to calculate the factorial of a number.

```
# Solution
def factorial(n):
    if n == 0:
        return 1
    else:
        return n * factorial(n-1)

num = int(input("Enter a number: "))
print(f"The factorial of {num} is {factorial(num)}")

Enter a number: 5
The factorial of 5 is 120
```

## 2. Variables and Data Types

**Question 6:** Create variables of different data types: integer, float, string, and boolean. Print their values and types.

```
# Solution
integer_var = 10
float_var = 10.5
string_var = "Hello"
boolean_var = True

print(f"Integer value: {integer_var}, type: {type(integer_var)}")
print(f"Float value: {float_var}, type: {type(float_var)}")
print(f"String value: {string_var}, type: {type(string_var)}")
print(f"Boolean value: {boolean_var}, type: {type(boolean_var)}")

Integer value: 10, type: <class 'int'>
Float value: 10.5, type: <class 'float'>
String value: Hello, type: <class 'str'>
Boolean value: True, type: <class 'bool'>
```

**Question 7:** Write a Python program to swap the values of two variables.

```
# Solution
a = 5
b = 10
print(f"Before swap: a = {a}, b = {b}")

# Swapping
```

```
a, b = b, a
print(f"After swap: a = {a}, b = {b}")
```

Before swap: a = 5, b = 10  
After swap: a = 10, b = 5

**Question 8:** Write a Python program to convert Celsius to Fahrenheit.

```
# Solution
celsius = float(input("Enter temperature in Celsius: "))
fahrenheit = (celsius * 9/5) + 32
print(f"{celsius}°C is equal to {fahrenheit}°F")

Enter temperature in Celsius: 28
28.0°C is equal to 82.4°F
```

**Question 9:** Write a Python program to concatenate two strings.

```
# Solution
string1 = "Hello"
string2 = "World"
concatenated_string = string1 + " " + string2
print(concatenated_string)

Hello World
```

**Question 10:** Write a Python program to check if a variable is of a specific data type.

```
# Solution
var = 10.5
if isinstance(var, float):
    print(f"{var} is a float")
else:
    print(f"{var} is not a float")

10.5 is a float
```

### 3. Basic Operators (Arithmetic, Comparison, Logical)

**Question 11:** Write a Python program to perform arithmetic operations: addition, subtraction, multiplication, and division.

```
# Solution
a = 5
b = 3

print(f"Addition: {a} + {b} = {a + b}")
print(f"Subtraction: {a} - {b} = {a - b}")
```

```
print(f"Multiplication: {a} * {b} = {a * b}")
print(f"Division: {a} / {b} = {a / b}")
```

```
Addition: 5 + 3 = 8
Subtraction: 5 - 3 = 2
Multiplication: 5 * 3 = 15
Division: 5 / 3 = 1.6666666666666667
```

**Question 12:** Write a Python program to demonstrate comparison operators: equal to, not equal to, greater than, less than.

```
# Solution
```

```
a = 5
b = 3
```

```
print(f"{a} == {b}: {a == b}")
print(f"{a} != {b}: {a != b}")
print(f"{a} > {b}: {a > b}")
print(f"{a} < {b}: {a < b}")
```

```
5 == 3: False
5 != 3: True
5 > 3: True
5 < 3: False
```

**Question 13:** Write a Python program to demonstrate logical operators: and, or, not.

```
# Solution
```

```
a = True
b = False
```

```
print(f"True and False: {a and b}")
print(f"True or False: {a or b}")
print(f"not True: {not a}")
```

```
True and False: False
True or False: True
not True: False
```

**Question 14:** Write a Python program to calculate the square of a number.

```
# Solution
```

```
num = float(input("Enter a number: "))
square = num ** 2
print(f"The square of {num} is {square}")
```

```
Enter a number: 5
The square of 5.0 is 25.0
```

**Question 15:** Write a Python program to check if a number is even or odd.

```
# Solution
num = int(input("Enter a number: "))
if num % 2 == 0:
    print(f"{num} is even.")
else:
    print(f"{num} is odd.")
```

Enter a number: 25  
25 is odd.

**Question 16:** Write a Python program to find the sum of the first n natural numbers.

```
# Solution
n = int(input("Enter a number: "))
sum_n = (n * (n + 1)) // 2
print(f"The sum of the first {n} natural numbers is {sum_n}")
```

Enter a number: 6  
The sum of the first 6 natural numbers is 21

**Question 17:** Write a Python program to check if a year is a leap year.

```
# Solution
year = int(input("Enter a year: "))
if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap year.")
```

Enter a year: 2024  
2024 is a leap year.

**Question 18:** Write a Python program to reverse a string.

```
# Solution
string = input("Enter a string: ")
reversed_string = string[::-1]
print(f"The reversed string is: {reversed_string}")
```

Enter a string: nayan  
The reversed string is: nayan

**Question 19:** Write a Python program to check if a string is a palindrome.

```
# Solution
string = input("Enter a string: ")
if string == string[::-1]:
    print(f"{string} is a palindrome.")
```

```
else:  
    print(f"{string} is not a palindrome.")
```

```
Enter a string: mom  
mom is a palindrome.
```

**Question 20:** Write a Python program to sort a list of numbers in ascending order.

```
# Solution  
numbers = [int(x) for x in input("Enter numbers separated by space:  
").split()]  
numbers.sort()  
print(f"Sorted list: {numbers}")
```

```
Enter numbers separated by space: 5 2 3 1 4 1 2 3  
Sorted list: [1, 1, 2, 2, 3, 3, 4, 5]
```