assignment_solution

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1 Lesson 1.2: Python Basics

1.1 Topics Covered:

- Syntax and Semantics
- Variables and Data Types
- Basic Operators (Arithmetic, Comparison, Logical)

1.2 1. Syntax and Semantics

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

```python
[1]: # Solution
     print("Hello, World!")
```

```
Hello, World!
```

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

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

```
You entered: 34
```

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

```python
[3]: # 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.")
```

```
The number is positive.
```

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

```python
[4]: # 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}")
```

The largest number is 45.0

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

```
[5]: # 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)}")
```

The factorial of 23 is 25852016738884976640000

1.3 2. Variables and Data Types

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

```
[6]: # 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.

```
[7]: # 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.

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

```
54.0°C is equal to 129.2°F
```

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

```
[9]: # 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.

```
[10]: # 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
```

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

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

```
[11]: # 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.

[12]:
```python
# 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.

[13]:
```python
# 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.

[14]:
```python
# Solution
num = float(input("Enter a number: "))
square = num ** 2
print(f"The square of {num} is {square}")
```

```
The square of 3.0 is 9.0
```

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

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

4 is even.

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

```
[16]: # 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}")
```

The sum of the first 5 natural numbers is 15

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

```
[17]: # 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.")
```

2004 is a leap year.

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

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

The reversed string is: irawit nayaran aytidu

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

```
[19]: # Solution
      string = input("Enter a string: ")
      if string == string[::-1]:
          print(f"{string} is a palindrome.")
      else:
          print(f"{string} is not a palindrome.")
```

indian institute of technology is not a palindrome.

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

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

Sorted list: [1, 2, 3, 3, 4, 4, 5, 5, 6, 21]