Activity Questions

Problem-1

What are the basic data types that we have seen in this week?

Answer

- int
- float
- str
- bool

Problem-2

How will the following objects be represented in Python?

- email address
- annual income
- number of days in a month

Answer

- email address: string
- annual income: float
- number of days in a month: integer

Problem-3

In computer science, a bit is the short form of a binary digit. A bit can assume one of the two values: 0 and 1. What unites the following terms?

- boolean
- state of a switch
- outcome of a coin toss
- outcome of a tennis match
- nodding your head

Answer

All these can be represented as bits.

Problem-4

Find the last digit of 7^{35}.

Answer

```python
num = 7 ** 35
last_digit = num % 10
print('The last digit is', last_digit)
```

Problem-5

Find the remainder when 987654321 is divided by 123456789.

Answer

```python
rem = 987654321 % 123456789
print('The remainder is', rem)
```

Problem-6

Predict the output of the following lines.

```
1  print(5 - 3)
2  print(5 - - 3)
3  print(5 - - - 3)
4  print(5 - - - - 3)
5  print(5 - - - - - 3)
```

Answer

Self-explanatory

Problem-7

Parenthesize this expression so that the result is zero.

```
1   2 ** 2 - 2 - 2 / 2
```

Answer

```
1   (2 ** 2 - 2 - 2) / 2
2   2 ** (2 - 2) - 2 / 2
```

Problem-8

Predict the output of the following expression.

```
1   0 == 0 < 1 < 2 < 3 > 2 > 1 > 0 == 0
```

Answer

`True`

Problem-9

If `some_string` is a string of length `n`, how many characters does `n * some_string` have, where `n` is some positive integer?

Answer

n^2

Problem-10

What will be the outcome of the following expression if `x` and `y` are two strings?

```
1   len(x) + len(y) == len(x + y)
```

Answer

`True`

Problem-11

What does the following code do? Is it syntactically correct?

```
1   print(input())
```

Answer

It is syntactically correct. It regurgitates the input onto the console.

Problem-12

Consider the following code snippet.

```
1  print(input() + input() + input())
```

If the output of the code snippet given above is `123`, what is the sequence of inputs entered by the user?

Answer

```
1  1
2  2
3  3
```

Problem-13

Use Python as a calculator and find the square root of the number: 12345678987654321.

Answer

```python
num = 12345678987654321
sq_num = num ** 0.5
print('The square root of', num, 'is', sq_num)
```

Problem-14

Find the number of digits in 7^{100}. Treat this as a programming question and not as a mathematical question. You should be able to do this using the concepts that you have learned so far.

Answer

```
num = 7 ** 100
num_str = str(num)
num_digits = len(num_str)
print('Number of digits in 7 power 100 is', num_digits)
```

Problem-15

Accept a word as input. Assume that all characters in the word are in lower case. Print `True` if the first and last letter of the word are the same, and `False` otherwise. You should be able to do this using the concepts introduced in this week.

Conditional statements can be used. They will be introduced in the next week. But the challenge is to solve this problem without using conditional statements! As an interesting exercise, can you list down some words that follow this pattern?

Answer

```
1  word = input()
2  print(word[0] == word[-1])
```

Problem-16

Accept a positive integer, x, as input from the user. Without using the `*` symbol anywhere in your code, print $10 \times x$, i.e. the product of the integer input and the number 10.

Answer

```python
x = input()
print(x + '0')
```

Problem-17

Accept the length and breadth of a rectangle as input and compute its area.

Answer

```
1   length = float(input())
2   breadth = float(input())
3   area = length * breadth
4   print('The area of the rectangle is equal to', area)
```

Problem-18

What is the following code snippet trying to do? Try to relate this to the previous question.

```
1  print(float(input()) * float(input()) * float(input()))
```

Answer

It prints the volume of a cuboid.

Problem-19

Consider the following code block:

```
1   x = int(input())
```

What happens if the input is `1.23`? Execute and observe the output. Why do you think this is happening?

Answer

`ValueError`

Problem-20

$f(x)$ is the greatest integer less than or equal to the real number x. For example, $f(1.2)$ is 1 and $f(4.8)$ is 4. Accept a positive real number x as input and print $f(x)$. Use the previous question as a hint.

Answer

```
1  x = float(input())
2  floor = int(x)
3  print(floor)
```

Problem-21

$g(x)$ is the smallest integer greater than or equal to the real number x. For example, $g(1.2)$ is 2 and $g(4.8)$ is 5. Accept a positive real number x as input and print $g(x)$.

Answer

```
1  x = float(input())
2  ceil = int(-(-x // 1))
3  print(ceil)
```

Problem-22

Accept the score of a student in an exam as input. Print `True` if the student has scored between 90 and 100, both endpoints included, and `False` otherwise. You can assume that the score is an integer.

Answer

```python
marks = int(input())
print(90 <= marks <= 100)
```

Problem-23

Consider the following code snippet:

```
1  a = int(input())
2  b = int(input())
3  print(0 < a < b < 10)
4  print(b - a == 1)
```

A user enters two integers as input and this is the output returned by the code:

```
1  True
2  True
```

How many different pairs - (a, b) - of inputs are possible for such a scenario?

Answer

8

Problem-24

Accept a two digit number as input and print the sum of its digits. What about a three digit number?

Answer

```python
# Two-digit number
num = int(input())
first_digit = num // 10
second_digit = num % 10
digit_sum = first_digit + second_digit
print(digit_sum)
```

```python
# Three digit number
num = int(input())
first_digit = num // 100
second_digit = (num // 10) % 10
third_digit = num % 10
digit_sum = first_digit + second_digit + third_digit
print(digit_sum)
```

Problem-25

Accept a positive integer as input and print `True` if it is a perfect square and `False` otherwise. For example, if the input is `25`, then you must print `True`. If the input is `15`, then you must print `False`.

Answer

```python
num = int(input())
sq_num = int(num ** 0.5)
print(sq_num ** 2 == num)
```