

Work through the following sections. Seek assistance whenever needed. From <http://schmidt.nuigalway.ie/cs102/python> files with Python programs can be downloaded. Present your results to one of the demonstrators, so that a record of your achievements can be kept.

10. TRUE OR FALSE?

1. Computers represent numbers using base 2 representations.
2. A float can represent a larger range of values than an int.
3. An int can represent indefinitely large numbers.
4. A Python string literal is always enclosed in double quotes.
5. The last character of a string `s` is at position `len(s)-1`.
6. Using `input` is the best way to get string data from the user.

11. MULTIPLE CHOICE.

1. Which of the following is not a Python numeric data type?
a) `int` b) `float` c) `rational` d) `long`
2. The most appropriate data type for storing the value of `pi` is
a) `int` b) `float` c) `long` d) `string`
3. The number of distinct values that can be represented using 5 bits is
a) 5 b) 10 c) 32 d) 50
4. In a mixed-type expression involving ints and floats, Python will convert
(a) floats to ints
(b) ints to long ints
(c) floats and ints to long ints
(d) ints to floats
5. Which of the following is not a Python type-conversion function?
a) `float` b) `round` c) `int` d) `long`
6. In Python, an int that grows too large
(a) causes an overflow
(b) converts to float
(c) breaks the computer
(d) converts to long int
7. Accessing a single character out of a string is called
(a) slicing
(b) concatenation
(c) indexing
(d) assignment

8. Which of the following is the same as `s[0:-1]`?
- (a) `s[-1]`
 - (b) `s[:]`
 - (c) `s[:len(s)-1]`
 - (d) `s[0:len(s)]`

12. PROGRAMMING EXERCISES.

1. Write a program to calculate the volume

$$V = \frac{4}{3}\pi r^3$$

and surface area

$$A = 4\pi r^2$$

of a sphere from its radius r , given as input.

2. Write a program that calculates the cost per square inch of a circular pizza, given its diameter and price. The formula for the area is $A = \pi r^2$.
3. Write a program to find the sum of the first n natural numbers, where the value of n is provided by the user. Use the accumulator pattern from the `factorial.py` program.
4. Write a program to find the sum of the cubes of the first n natural numbers, where the value of n is provided by the user.
5. Write a program to sum a series of numbers entered by the user. The program should first prompt the user for how many numbers are to be summed. It should then input each of the numbers and finally print a total sum.
6. Write a program that finds the average of a series of numbers entered by the user. As in the previous problem, the program will first ask the user how many numbers there are. Note: the average should always be a float, even if the user inputs are all ints.
7. Write a program that approximates the value of π by summing the terms of this series:

$$\frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \dots$$

The program should prompt the user for n , the number of terms to sum, and then calculate and output the sum of the first n terms of this series. Have your program subtract the approximation from the value of `math.pi` to see how accurate it is.

8. A *Fibonacci sequence* is a sequence of numbers where each successive number is the sum of the previous two. The classic Fibonacci sequence begins:

$$1, 1, 2, 3, 5, 8, 13, \dots$$

Write a program that computes the n th Fibonacci number where n is a value input by the user. For example, if $n = 6$, then the result is 8.