**Activities: Python Data Types**

The activities here will give you the opportunity to practice the skills and tools presented in this lesson, with the following objectives:

1. Demonstrate the use of a variety of data types in Python, including numbers, booleans, and strings.
2. Distinguish between float values, integers, and complex numbers.
3. Use Python to perform operations using numbers.
4. Use Python to perform logic operations using booleans.
5. Use Python to manipulate string values.

Note that software development skills build on each other, so many of the activities here will also require skills and tools presented in earlier lessons.

**Activity 1**

Create a computer program that performs the following steps:

1. Prompt the user for an integer and store the value in a variable.
2. Display the data type of the variable that holds the entered data.
3. Convert the value to an integer type and store the converted value in a new variable.
4. Display the value and type of the new variable in a single sentence. (For example, "The value is 8 with type integer.")
5. Run the program and enter a float value at the prompt. What is its value in the last step?

Refactor the program, using a float instead of an integer. What happens if you enter an integer rather than a float at the prompt?

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| # Prompt the user for an integer and store the value in a variable  user\_num = input("Please enter a number: ")  # Display the data type of the variable that holds the entered data  print("The value is", user\_num, "with type", type(user\_num))  # Convert the value to an integer type and store the converted value in a new variable  converted\_value = int(user\_num)  # Display the value and type of the new variable in a single sentence  print("The value is", converted\_value, "with type", type(converted\_value))  # Convert the value to a float type and store the converted value in a new variable  converted\_value\_float = float(user\_num)  # Display the value and type of the new variable in a single sentence  print("The value is", converted\_value\_float, "with type", type(converted\_value\_float)) |

**Activity 2**

Update the code below so that the result is equal to 576. Do not change any of the existing values or operators or the order in which they appear.

# do not change the order in which the numbers and operators appear in the next line

result = 5 + 3 \*\* 2 \* 9

print(result) # the output should be 576

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| # do not change the order in which the numbers and operators appear in the next line  result = (5 + 3) \*\* 2 \* 9  print(result) |

**Activity 3**

Create a computer program that prompts the user for a float number and returns the integer portion of the floating number.

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| # Prompt the user to enter a float number  num\_input = input("Please enter a float number: ")  # Convert the input to a float  try:      float\_number = float(num\_input)        # Get the integer portion of the floating-point number      integer\_portion = int(float\_number)        # Display the integer portion      print("The integer portion of " + str(float\_number) + " is " + str(integer\_portion) + ".")  except ValueError:      print("Invalid input. Please enter a valid float number.") |

**Activity 4**

Write a computer program that calculates and displays the current value of a deposit for a given initial deposit, interest rate, how many times interest is calculated per year, and the number of years since the initial deposit.

The program should prompt the user for each of the values and use the following formula to calculate the current value of the deposit:

V = P(1 + r/n)^nt

where

V -- value

P -- initial deposit

r -- interest rate as a fraction (eg 0.05)

n -- the number of times per year interest is calculated

t -- the number of years since the initial deposit

The program should display each of the values entered to the user in a meaningful way (so that the user can easily see what each value represents), along with the results of the calculation.

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| # Prompt the user for each of the values  P = float(input("Please enter the initial deposit (P): "))  r = float(input("Please enter the annual interest rate as a decimal (Ex. 0.05 for 5%): "))  n = int(input("Please enter the number of times the interest is calculated per year (n): "))  t = int(input("Please enter the number of years since the initial deposit (t): "))  # Calculate the current value of the deposit  V = P \* (1 + r / n) \*\* (n \* t)  # Display each of the values that entered  print("Initial deposit (P): " + str(P))  print("Annual interest rate (r): " + str(r))  print("Number of times interest is calculated per year (n): " + str(n))  print("Number of years since the initial deposit (t): " + str(t))  # The calculation result  print("The current value of the deposit (V) is: " + "{:.2f}".format(V)) |

**Activity 5**

Write a computer program that prompts the user for a principal amount, the rate of interest, and the number of days for a loan and then calculates and returns the simple interest for the life of the loan. Use the formula:

interest = principal \* rate \* days / 365

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| # Prompt the user for the principal amount, rate of interest, and number of days for the loan  principal = float(input("Please enter the principal amount: "))  rate = float(input("Please enter the rate of interest (as a decimal  Ex. 0.05 for 5%)): "))  days = int(input("Please enter the number of days for the loan: "))  # Calculate the simple interest  interest = principal \* rate \* days / 365  # Display the entered values and the calculated interest  print("Principal amount: " + str(principal))  print("Rate of interest: " + str(rate))  print("Number of days for the loan: " + str(days))  # Display the result of the calculation  print("\n The simple interest for the life of the loan is: " + "{:.2f}".format(interest)) |

**Activity 6**

Create a computer program that displays three statements that evaluate to True and three statements that evaluate to False.

Example:

a = 0

b = 1

Output: a < b = True

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| # Define variables  x = 50  y = 80  z = 130  # Display the values of variables  print("Variables value:")  print("x =", x)  print("y =", y)  print("z =", z)  # Display the statements and their evaluations  print("\nStatements that evaluate to True:")  print("x < y =", x < y)  print("y < z =", y < z)  print("x + y == z =", x + y == z)  print("\nStatements that evaluate to False:")  print("x > y =", x > y)  print("y == z =", y == z)  print("x + z < y =", x + z < y) |

**Activity 7**

Create a computer program that prompts the user for a number and calculates the following:

* the boolean of the number entered
* the binary equivalent of the number entered
* the square root of the number entered

The program should display the following to the user:

* The number the user entered, in a phrase like, "You selected value."
* The boolean of the number, in a phrase like, "The boolean of your number is value."
* The binary equivalent of the number, in a phrase like, "The binary equivalent of your number is value"
* The square root of the number, in a phrase like, "The square root of your number is value," with the value rounded to three decimal places.

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| import math  # Prompt the user for a number  number = float(input("Please enter a number: "))  # Calculate the boolean  boolean\_value = bool(number)  # Calculate the binary equivalent  binary\_value = bin(int(number))  # Calculate the square root  square\_root\_value = math.sqrt(number)  # Display the results  print("You selected", number)  print("The boolean of your number is", boolean\_value)  print("The binary equivalent of your number is", binary\_value)  print("The square root of your number is {:.3f}".format(square\_root\_value)) |

**Activity 8**

Create a computer program that completes the following tasks:

* It prompts the user for a series of 5 integers.
  + The user must be prompted for 5 numbers.
* After the fifth entry, the program stops prompting for values and performs the following calculations:
  + the product of the integers
  + the average of the integers
  + the sum of the integers
* After performing the calculations, the program should display the following to the user:
  + the values the user entered
  + each of the calculations, using a phrase that identifies the value

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| # Prompt the user for 5 integers  numbers = [int(input(f"Please enter integer {i + 1}: ")) for i in range(5)]  # Calculate the product, average, and sum of the integers  product = 1  for num in numbers:      product \*= num  average = sum(numbers) / len(numbers)  total\_sum = sum(numbers)  # Display the entered values and the calculated results  print("\nThe values you entered:", numbers)  print("Product of the integers:", product)  print("Average of the integers:", average)  print("Sum of the integers:", total\_sum) |

**Activity 9**

Write a program that performs the following steps:

* Start with a street address that includes a building/house number, the name of the street, and the type of street (e.g., Street, Avenue, Boulevard, etc.).
  + You can use any address you wish and abbreviations are acceptable.
  + An example is 25 Main Street.
* Display the full address to the user.
* Display the house number only in a phrase like, "The building or house number is 25."
* Display the street name in a phrase like, "The street name is Main Street."

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| # Define the street address components  building\_number = 25  street\_name = "Tripoli Steet,"  street\_type = "Dubai"  # Display the full address to the user  print("Full Address:", building\_number, street\_name, street\_type)  # Display the building/house number  print("The building number is", building\_number)  # Display the street name  print("The street name is", street\_name, street\_type) |

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