ICS2O0​ Module B.1 Python Programming Introduction​ Name: Karamvir Singh

Outline

Access the Python Development environment and follow the tutorial to gain an initial exposure to a programming language. Begin to develop an familiarity with basic programming concepts.

Objectives

• Use correct terminology to describe programming concepts;

• Describe the types of data that computers can process and store (e.g., numbers, text);

• Explain the difference between constants and variables used in programming;

• Use variables, expressions, and assignment statements to store and manipulate numbers and text in a program

Materials

• Python3 Development Environment at: //repl.it/

• Python Tutorial at: http://www.letslearnpython.com/learn/

Accessing the Python3 Web IDE Environment

Accessing the IDE

• Go to: https://repl.it/

• Select Python3

• Sign-up / Create an account

• Make sure you can remember your account information for the rest of the course.

Using the IDE

• Use the black area like a calculator to try simple statements or commands

• Use the white area to create programs with multiple statements

Accessing the Tutorial

Accessing the Tutorial

• Go to: http://www.letslearnpython.com/learn/

• Read up to “Lesson 3: Math”

Level 1: Basic Math & Strings

Access the Tutorial and start at “Lesson 3: Math”.

Questions

1. Complete “Lesson 3: Math – Math Basics” by typing the sample commands in the black area of the IDE.

a. Create your own expression using 5 “+” and “-“ operators.

b. List your expression and the result below.

5+4=9 When the number 5 is added by 4, the answer is 9.

5-2=3 When the number 5 is subtracted by 2, the answer is 3.

2. Complete “Lesson 3: Math – More Operators” by typing the sample commands in the black area of the IDE.

a. Create your own expression using 5 “\*” and “/” operators.

b. List your expression and the result below.

5\*4=20 When the number 5 is multiplied by 4, the answer is 20.

5/2= 2.5 When the number 5 is divided by 2, the answer is 2.5.

3. Complete “Lesson 3: Math – More Division” by typing the sample commands in the black area of the IDE.

a. Create one division expression that gives a whole number answer

b. And one division expression that gives a decimal number answer.

c. List your expressions and the results below.

54/6=9.0 When the number 54 is divided by 6, the answer is 9.0.

9/6=1.5 When the number 9 is divided by 6, the answer is 1.5.

4. Complete “Lesson 3: Math – Floats” by typing the sample commands in the black area of the IDE.

a. Use the “round()” function for the expressions you created in question #3 above.

b. List your “round()” expressions and the results they return below.

round(54/6)=9 When the number 54 is divided by 6, the rounded answer is 9.

round(9/6)=2 When the number 9 is divided by 6, the rounded answer is 2.

5. Read through “Lesson 3: Math – Comparison Operators”.

a. Why do you think Equals is “==” instead of “=”?

I think Equals is “==“ instead of “=“ because we are comparing values and we are asking Python if a certain thing is equal to another thing.

b. What does “=” mean?

The sign “=“ means that we are assigning a value.

6. Complete “Lesson 3: Math – Practice” and “Lesson 3: Math – Practice Answers” by typing the sample commands in the black area of the IDE.

a. Create an expression using 5 different operators that returns a “True” result

b. And an expression using 5 different operators that returns a “False” result.

c. List your expressions and the results returned below.

10==10 =>True, 9!=3 =>True, 4<10 =>True, 6>5 =>True, 9<=10 =>True.

9==3 =>False, 4!=4 =>False, 9<4 =>False, 10<=3 =>False, 1>=6 =>False.

7. Complete “Lesson 4: Strings – Strings” and “Lesson 4: Strings – Examples” by typing the sample commands in the black area of the IDE.

a. Explain why typing “apple” works and why typing apple without quotes gives an error.

The reason why the string “apple” works is because it is typed in quotes. The reason why the word apple without quotes gives an error is because Python only reads strings that are typed in quotes.

b. Also explain why “2 + 5” does not equal 7.

The reason why “2+5” does not equal to 7 is because it is a string which means it is not a math expression being asked to Python.

8. Complete “Lesson 4: Strings – Operators” by typing the sample commands in the black area of the IDE.

a. Explain why typing “appl” + “e” works and why typing “apple” - “e” gives an error.

The reason why typing “appl” + “e” works is because the addition (+) symbol is a string operator called concatenation. The reason why typing “apple” - “e” gives an error is because the subtraction (-) symbol is not a string operator.

b. Also explain why “Hello” \* 10 works but why “Hello” / 10 does work.

The reason why “Hello” \* 10 works is because the asterisk (\*) symbol is an operator string. The reason why “Hello” / 10 does not work is because the forward slash (/) is not a string operator.

9. Complete “Lesson 4: Strings – Indexes” by typing the sample commands in the black area of the IDE.

a. List the letters in your first name and the index for each letter in your first name.

K a r a m v i r

0 1 2 3 4 5 6 7

10. Complete “Lesson 4: Strings – Indexes Examples” by typing the sample commands in the black area of the IDE.

a. Explain why print(“Hello!”[4]) does not print “l”.

The reason why print(“Hello!”[4]) does not print “l” is because the index for the first letter starts at 0.

b. What does print(“Hay, Bob!”[4]) print? For a hint try print(“Hay, Bob!”[3]) and print(“Hay, Bob!”[5])

The entry print(“Hay, Bob!”[4]) prints the space that is located in index number 4.

11. Complete “Lesson 4: Strings – Rules” by typing the sample commands in the black area of the IDE.

a. Explain why print(“Hello!”[7]) gives an error.

The reason why print(“Hello!”[7]) gives an error is because there are only 5 indexes in the string and not 7.

Level 2: Booleans & Variables

Access the Tutorial and start at “Lesson 5: Variables”

Questions

1. Complete “Lesson 5: Variables – Save a Value” by typing the sample commands in the black area of the IDE.

a. What do you get if you type puppies / 3?

By typing puppies / 3, you get the answer 12.0.

b. Why doesn’t typing kittens / 3 work?

The reason why kittens / 3 does not work is because the name kitten has not been defined.

2. Complete “Lesson 5: Variables – Assign a New Value” by typing the sample commands in the black area of the IDE.

a. Explain how the following sequence of commands works:

• puppies = 36

By typing puppies = 36, you are defining the name puppies to equal to the number 36.

• puppies = puppies / 6

By typing puppies = puppies/6, you are dividing the name puppies (the number 36) by 6. Resulting in the answer 6.0.

• puppies

By typing the name puppies, you are asking Python to determine the assigned value of the variable.

3. Read through “Lesson 5: Variables – Rules”.

4. Complete “Lesson 5: Variables – Math Operators” by typing the sample commands in the black area of the IDE.

a. Explain what happens for following sequence of commands:

• colour = “red”

By typing colour =“red”, you are defining the name colour to mean the string “red”.

• puppies = 36

By typing puppies = 36, you are defining the name puppies to mean the integer 36.

• colour + puppies

When you type colour + puppies, you receive an error because you can not add a string to an integer.

5. Complete “Lesson 5: Variables – String Operators” by typing the sample commands in the black area of the IDE.

a. Explain why the following commands give different results:

• Color + day \* fishes

The reason this command gives the result “yellowMondayMondayMonday” is because Python multiplied day by fishes, and then it added Color to it.

• ( Color + day ) \* fishes

The reason this command gave the result “yellowMondayyellowMondayyellowMonday” is because Python added the variables Color and day that were in the brackets first, and then multiplied it by fishes.

6. Complete “Lesson 5: Variables – Indexes” by typing the sample commands in the black area of the IDE.

a. What is the index of ‘r’ in “watermelon”?

The index of ‘r’ in “watermelon” is 4.

b. Write an expression using mynumber to return ‘r’

Fruit = “watermelon”

mynumber = 6

Fruit[mynumber-2]

= ‘r’

By typing Fruit[mynumber-2], Python is subtracting 2 from mynumber(6) which equals the index 4. The index number 4 of “watermelon” is ‘r’.

7. Complete “Lesson 5: Variables – Assignments or Comparisons” by typing the sample commands in the black area of the IDE.

a. What is the difference between “=” and “==”?

The difference between “=” and “==” is that an “=” sign is used when we are assigning a value. An “==” sign on the other hand, is used to compare values.

b. Create your own mnemonic to remember this difference.

An “==” sign is longer which means it is to compare values and an “=” sign is shorter which means it is to assign a value.

8. Complete “Lesson 6: Errors – Examples” by typing the sample commands in the black area of the IDE.

a. What doesn’t “friend” + 5 work?

The reason why “friend” + 5 does not work is because Python can not combine a string with an integer.

b. What is the difference between int and str?

The difference between an int and a str is that an integer is a whole number and a string is made up of characters that are inside quotes.

9. Read through “Lesson 6: Errors – Parts of an Error Message”.

a. Is “friend” + 5 an example of:

i. A Syntax Error?

ii. A Runtime Error?

iii. A Logic Error?

“friend” + 5 is an example of a syntax error because the error occurred before the program started to run.

10. Read through “Lesson 6: Errors – Fixing Errors”.

a. Use the ‘print’ command to print your first name and last name.

print(“Karamvir Singh”) and print(“Karamvir”, “Singh”)

11. Complete “Lesson 7: Booleans – Types of Data” by typing the sample commands in the black area of the IDE.

a. What is the value of: type(“True”)

The value of type(“True”) is <class ‘str’> meaning that it is a string.

b. What is the value of: type( True )

The value of type( True ) is <class ‘bool’> meaning that it is a Boolean.

c. Why is the result different?

The result is different because “True” is inside quotation marks which means that it is a string. When True is not in quotation marks, the result is a Boolean because it is one of the possible outcomes of that type.

12. Complete “Lesson 7: Booleans – What Is A Boolean” by typing the sample commands in the black area of the IDE.

a. Why do you think that having a Boolean data type is important in computer programming?

I think that having a Boolean data type is important in computer programming because it is required to make decisions in our code.

13. Complete “Lesson 7: Booleans – Trying Out Booleans” by typing the sample commands in the black area of the IDE.

a. Why do you think that there is no Maybe” Boolean data value in computer programming?

I think that the reason why there is no “Maybe” Boolean data value in computer programming is because a Boolean is a yes or no answer.

Level 3: Lists & Logic

Access the Tutorial and start at “Lesson 7: Booleans”

Questions

1. Complete “Lesson 7: Booleans – AND Comparisons” by typing the sample commands in the black area of the IDE.

a. Try the following Python statements and record the results.

i. True and True

= True

When “True and True” is typed in the black area of the IDE, the answer in return is “True”.

ii. True and False

= False

When “True and False” is typed in the black area of the IDE, the answer in return is “False”.

iii. False and True

= False

When “False and True” is typed in the black area of the IDE, the answer in return is “False”.

iiii. False and False

= False

When “False and False” is typed in the black area of the IDE, the answer in return is “False”.

b. Explain if there are any other combinations of True / False.

No, there are no other combinations of True / False.

c. Explain how the AND operator is similar to a math operator and how it is different.

The AND operator is similar to a math operator because if an answer is true, then the outcome of the answer will also be true. The AND operator is different than a math operator because it has two comparisons rather than a question being asked.

2. Complete “Lesson 7: Booleans – OR Comparisons” by typing the sample commands in the black area of the IDE.

a. Try the following Python statements and record the results.

i. True or True

= True

The answer for True or True is True.

ii. True or False

= True

The answer for True or False is True.

iii. False or True

= True

The answer for False or True is True.

iiii. False or False

= False

The answer for False or False is False.

b. Explain how the OR operator is similar to the AND operator and how it is different.

The OR operator is similar to the AND operator because there are two comparisons. The OR operator is different than an AND operator because only a False or False question can result in a False answer. Only a True and True Question can result in a True answer.

3. Complete “Lesson 7: Booleans – NOT Comparisons” by typing the sample commands in the black area of the IDE.

a. Try the following Python statements and record the results.

i. not (True or True)

=False

The answer for not (True or True) is False.

ii. not (True or False)

=False

The answer for not (True or False) is False.

iii. not (False or True)

=False

The answer for not (False or True) is False.

iiii. not (False or False)

=True

The answer for not (False or False) is True.

b. Explain how the combination of the NOT & OR operators is similar to the AND operator by itself and how it is different.

The combination of the NOT & OR operators is similar to the AND operator because there are two comparisons. The combination of the NOT & OR operators is different than the AND operator because it has the word “or” in the question.

4. Complete “Lesson 7: Booleans – Expressions” by typing the sample commands in the black area of the IDE.

a. Explain why the following two Python statements give different results.

i. not (True or True)

=False

ii. not True or True

=True

These two Python statements give different results because the first one is a NOT comparison operator and the second one is an expression.

b. Explain why the following two Python statements give the same results.

i. not (True and True)

=False

ii. not True and True

=False

These two Python statements give the same results because they are both Booleans.

5. Complete “Lesson 7: Booleans – Practice” by typing the sample commands in the black area of the IDE.

a. Create three more practice expressions similar to those in the tutorial.

3 != 1 and 4 == 4

1 >= 4 and 2 == 3

3 == 3 or 4 != 6

b. Provide the results for your practice expressions

3 != 1 and 4 == 4

=True

1 >= 4 and 2 == 3

=False

3 == 3 or 4 != 6

=True

6. Complete “Lesson 8: Lists – A Collection of Objects” by typing the sample commands in the black area of the IDE.

a. Create a list of your favorite sports teams.

[“Toronto Raptors”, “Toronto Blue Jays”, “Toronto Maple Leafs”]

b. Assign your list to a variable.

Team = [“Toronto Raptors”, “Toronto Blue Jays”, “Toronto Maple Leafs”]

c. Confirm that your variable and your list are the same.

Team = [“Toronto Raptors”, “Toronto Blue Jays”, “Toronto Maple Leafs”]

=

Type(Team)

= <class ‘list’>

7. Complete “Lesson 8: Lists – List Indexes” by typing the sample commands in the black area of the IDE.

a. What is the list index of the last team in your list of favorite sports teams.

Team[2]

The list index of the last team in my list of favourite sports teams is 2.

b. In the tutorial, the error produced by typing “fruit[3]” is an example of:

i. A Syntax Error?

ii. A Runtime Error?

iii. A Logic Error?

The error produced by typing “fruit[3]” is an example of a syntax error.

8. Complete “Lesson 8: Lists – Practice” and “Lesson 8: Lists – Practice Answers” by typing the sample commands in the black area of the IDE.

colors = ["blue", "pink", "purple"]

print(colors[0])

print(colors[1])

print(colors[2])

=blue

=pink

=purple

NOTE: Starting with Lesson 9 you should use the WHITE area of the IDE for entering example code with multiple statements.

9. Complete “Lesson 9: Logic – Making Decisions” by typing the sample commands in the white area of the IDE.

a. Modify the tutorial code to print “Hi Alfred!” based on a decision using numbers

myname=10

if myname==10:

print(“Hi Alfred!”)

10. Complete “Lesson 9: Logic – Adding A Choice” by typing the sample commands in the white area of the IDE.

a. Modify the tutorial code to print your first name or your last name based on a choice (using “else”).

myname=“Karamvir”

if myname==“Karamvir”:

print(“Hi Karamvir!”)

else:

print(“Singh!”)

11. Complete “Lesson 9: Logic – Adding Many Choices” and “Lesson 9: Logic – Practice” by typing the sample commands in the white area of the IDE.

a. Modify the tutorial code and “elif” statements to make a choice using at least 4 of your friends names

myname=“Ramanvir”

if myname==“Ramanvir”:

print(“Hi Ramanvir!”)

elif myname==“Saj”:

print(“Hi Saj!”)

elif myname==“Tejas”:

print(“Hi Tejas!”)

else:

print(“Hi Pritpal!”)