Name: ……………………………………………….. ( ) Class: ……… Date: …………………..

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| **4.1** | **Program Development** | **Strings and Input/Output** |

A string is any sequence of characters. We usually use them to store words, sentences or even entire paragraphs. The data type of a string is str.

**Creating a String**

To enter a string directly in Python, you enclose its contents with single quotes (e.g., 'abc') or double quotes (e.g., "abc").

**String Operators and Methods**

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| --- | --- | --- | --- |
| **Method** | **Argument(s)** | **Returns** | **Examples** |
| str.endswith() | A str | A bool that indicates whether the str ends with the argument | >>> **'Computing'.endswith('ing')**  True  >>> **'Computing'.endswith('ING')**  False |
| str.startswith() | A str | A bool that indicates whether the str starts with the argument | >>> **'Computing'.startswith('Com')**  True  >>> **'Computing'.startswith('com')**  False |
| str.find() | A str | Lowest index in str where the argument is found, -1 otherwise | >>> **'Computing'.find('put')**  3  >>> **'Computing'.find('on')**  -1 |
| str.format() | Any number of values | A new str with each field (such as '{}' or '{0}') in the str replaced by a corresponding argument | >>> **'{} 2017'.format('CS')**  'CS 2017'  >>> **'{0} {1}'.format(6, 5)**  '6 5'  >>> **'{1} {0}'.format(6, 5)**  '5 6' |
| str.isalnum() | None | A bool that indicates whether every character in the str is alphanumeric (either a letter or a digit) | >>> **'CS2017'.isalnum()**True>>> **'CS 2017'.isalnum()**False>>> **'2017'.isalnum()**True |
| str.isalpha() | None | A bool that indicates whether every character in the str is a letter | >>> **'Computing'.isalpha()**True>>> **'Com pu ting'.isalpha()**False |
| str.isdigit() | None | A bool that indicates whether every character in the str is a digit | >>> **'Computing'.isdigit()**False>>> **'2017'.isdigit()**True |
| str.isspace() | None | A bool that indicates whether every character in the str is a space | >>> **' '.isspace()**True>>> **''.isspace()**False |
| str.islower() | None | A bool that indicates whether every character in the str is a lower-case letter | >>> **'computing'.islower()**True>>> **'Computing'.islower()**False>>> **'2017'.islower()**False |
| str.isupper() | None | A bool that indicates whether every character in the str is an upper-case letter | >>> **'COMPUTING'.isupper()**True>>> **'COM PU TING'.isupper()**False>>> **'2017'.isupper()**False |
| str.lower() | None | A str containing every character of the original str converted to lowercase | >>> **'Computing'.lower()**'computing' |
| str.upper() | None | A str containing every character of the original str converted to uppercase | >>> **'Computing'.upper()**'COMPUTING' |

1. Write down the actual output of the following string methods:

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| --- | --- |
| **Method** | **Actual Output** |
| >>> **'Hello World'.endswith('ld')** |  |
| >>> **'2017'.startswith('20')** |  |
| >>> **'CS2017'.find('20')** |  |
| >>> **'CS2017'.find('21')** |  |
| >>> **'PIZza'.lower()** |  |
| >>> **a = 'Hello'**  >>> **a.upper()** |  |
| >>> **'PIZza'.islower()** |  |
| >>> **'CS2017'.isupper()** |  |
| >>> **' '.isspace()** |  |
| >>> **' Computing'.isspace()** |  |
| >>> **'Computing 2017'.isalnum()** |  |
| >>> **'Computing2017'.isalnum()** |  |
| >>> **'computing'.isalpha()** |  |
| >>> **'CS2017'.isalpha()** |  |
| >>> **'2017'.isdigit()** |  |
| >>> **'2017 '.isdigit()** |  |

1. Enter the following code to assign two different strings to the variables x and y:

|  |
| --- |
| >>> **x = 'Hello'**  >>> **y = "World"** |

Next, write down the expected output of the following operations. Then test the code in Python shell and write down the actual output.

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| --- | --- | --- |
| **Operation** | **Expected Output** | **Actual Output** |
| >>> **'Hello' + "World"** |  |  |
| >>> **x + y** |  |  |
| >>> **x \* 2** |  |  |
| >>> **2 \* x** |  |  |
| >>> **x + " " + y** |  |  |

What does " " mean? …………………………………………………………………………………………………………

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1. Enter the following code to assign two different strings to the variables p and q:

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| --- |
| >>> **p = "ba"**  >>> **q = "na"** |

Write a one-line expression that uses the two strings p and q as well as the + and \* operators to create the output string "banana":

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|  |

1. Try out the following lines of code, record the output, then use the results to write down a description of what each line of code does:

|  |  |  |
| --- | --- | --- |
| **Code** | **Actual Output** | **What it does** |
| >>> **"man" in "maneater"** |  |  |
| >>> **"eat" not in "theatre"** |  |  |
| >>> **len("maneater")** |  |  |

1. Enter the following code to assign a string to the variable s:

|  |
| --- |
| >>> **s = "Computing"** |

Then, write down the actual output of the following string operations:

|  |  |
| --- | --- |
| **Code** | **Actual Output** |
| s[0] |  |
| s[3] |  |
| s[-2] |  |
| s[0:2] |  |
| s[1:2] |  |
| s[:2] |  |
| s[::2] |  |
| s[0::4] |  |
| s[9:0:-2] |  |

1. Enter the following code to assign a new string to the variable s:

|  |
| --- |
| >>> **s = "Imagination"** |

Then, write down the code for extracting the following strings from the characters in s using the slice operator and slice operator with a step:

|  |  |
| --- | --- |
| **Code** | **Extracted String** |
|  | Imagin |
|  | nation |
|  | Igao |

1. Enter the following code to assign a string to the variable z:

|  |
| --- |
| >>> **z = 'banananananananab'** |

Which of the following lines of code return ‘banana’? Tick all answers that apply.

|  |  |
| --- | --- |
|  | z[:6] |
|  | z[::3] |
|  | z[-1:10:-1] |
|  | z[:10:-1] |
|  | z[0:10:-1] |
|  | z[:-6:-1] |
|  | z[-1:-7] |
|  | z[-6:][::-1] |
|  | z[0:2] + (z[-2] + z[2])[::-1] \* 2 |
|  | z[:-11] |

**Escape Codes**

There are several escape codes that you will need to learn.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **\\** | **\'** | **\"** | **\n** | **\t** | **\** |

1. Type in the following code and describe what each escape code does:

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| --- | --- | --- |
| **Escape Code** | **Code** | **What the escape code does** |
| \n | >>> **print("Phrase 1.\n Phrase 2.")** |  |
| \t | >>> **print("Phrase 1.\t Phrase 2.")** |  |

1. Write down the actual output of the following code:

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| --- |
| >>> **first = "Let's try escape characters.\nType them out.\n"**  >>> **second = "How will it appear?"**  >>> **print(first + second)** |

Actual Output:

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1. The following string value has an error. Correct the error using an escape code:

|  |
| --- |
| >>> **'2017 is Bala's first year of studying Computing.'** |

Corrected Code:

|  |
| --- |
|  |

**String Formatting**

1. Type and run the following code in the Python shell. Write down the actual output:

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| --- |
| >>> **x = "There are {} types of people in this world.".format(2)**  >>> **gender1 = "Males"**  >>> **gender2 = "females"**  >>> **y = "{} from Mars and {} from Venus".format(gender1, gender2)**  >>> **print(x)**  >>> **print(y)** |

Actual Output:

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| --- |
|  |

**Console Input/Output**

1. The following line of code to ask the user for input has an error. Write down the corrected code in the space provided:

|  |
| --- |
| >>> **user\_name = input("Enter your name please: )"** |

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1. The following line of code to ask the user for input has an error. Write down the corrected code in the space provided:

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| --- |
| >>> **value = int(input("Enter your age: ")))** |

|  |
| --- |
|  |

1. Write down the actual output of the following code. Type in your name when prompted:

|  |
| --- |
| **start = "Hello, "**  **name = input("What is your name? ")**  **end = "\n How are you today?"**  **sentence = start + name + end**  **print(sentence)** |

Actual Output:

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| --- |
|  |

1. Write down the actual output of the following code. Type in your name when prompted:

|  |
| --- |
| **movie = input("What is your favourite movie? ")**  **age = input("How old are you? ")**  **print("At age {}, your favourite movie is {}.".format(age, movie))** |

Actual Output:

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| --- |
|  |

1. Write a program that asks a user for his/her weight (in kg) and height (in m). It will output the user’s body mass index. The formula for body mass index is given below. *(Hint: You will need to use the input() and float() functions.)*

Below are some samples of how the program should behave when it is working as intended:

|  |  |
| --- | --- |
| **Sample 1** | Enter your weight in kg: **60**  Enter your height in metres: **1.70**  Your body mass index is 20.761245674740486. |
| **Sample 2** | Enter your weight in kg: **85.5**  Enter your height in metres: **1.61**  Your body mass index is 32.98483854789553. |

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