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STEM Digital Academy

School of Science & Technology

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Function Examples and Document Strings

Programming and Algorithms

Lecture by

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```
n = 3
for i in range(1,n+1):
    print("Hello World!")
```

```
Hello World!
Hello World!
Hello World!
```

What will we Cover?

- The use of functions in problem decomposition
- Invoke functions in the program to perform tasks
- Write simple programs incorporating user defined functions

User Defined Function Example I

Function with no parameters

```
def print_message():          # function header
    print("Hello World!")     # function body

print_message()               # function call
```

```
Hello World!
```

Function with no return statement

User Defined Function Example II

Function with two parameters

Function returns one value

Function call with two arguments

```
def calculate_total(x, y):  # function header
    total = x + y           # function body
    return total

num1 = 101
num2 = 110
my_total = calculate_total(num1, num2) # function call
print("Total of", num1, "and", num2, "=", my_total)
```

```
Total of 101 and 110 = 211
```

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Docstring: Documentation String

- An optional description of the function
- Included with triple double quotes (opening and closing) in the body of the function
- Can be used to describe the purpose of the function, description of data and expected result

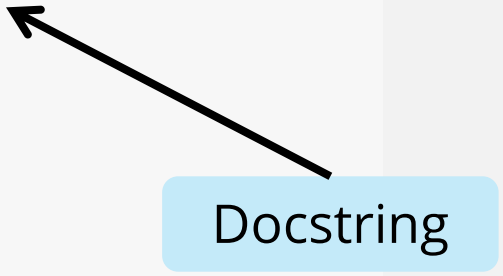
Docstring Example

```
def calculate_average(x, y, z): #function header
    """This function calculates an average of 3 numbers
    The three arguments should be numeric and non-zero
    Output is a floating-point value"""

    total = x + y + z
    average = total / 3
    return average

num1, num2, num3 = 13, 19, 27
result = calculate_average(num1, num2, num3)
print(result)
```

```
19.666666666666668
```



Creating a Custom Function Example I

Problem

Calculate the area and circumference of a circle with user input radius

Formulas

$$Area = \pi * radius^2$$

$$Circumference = 2 * \pi * radius$$

Note: π is a constant, which is approximately equal 3.14

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Creating a Custom Function Example II

Why use a user defined function here?

- Area and perimeter can be calculated for different values of the inputs i.e., radius
- Program can be decomposed into two functions: one to calculate the area and one to calculate the circumference
- Better management and reusability

Creating a Custom Function Example III

Algorithm

1. read in radius
2. function calculate_area(r)
3. return pi * r * r
4. function calculate_circumference (r)
5. return pi * 2 * r
6. calculate_area(radius)
7. calculate_ circumference (radius)
8. display results

Creating a Custom Function Example IV

```
pi = 3.14
def calculate_area(r):
    global pi
    circle_area = pi * r * r
    return circle_area
def calculate_circumference(r):
    global pi
    circumference = 2 * pi * r
    return circumference

radius = float(input("Enter a value for radius: "))
print("The area is: {:.2f}".format(calculate_area(radius)))
print("The circumference is: {:.2f}".format(calculate_circumference(radius)))
```

```
Enter a value for radius: 2.5
The area is: 19.62
The circumference is: 15.70
```

Try It Yourself I

Write a function in python environment that

- determines how many days there are in a particular month
- The input should be read as the month name (assuming a non-leap year) in the main program.

Try It Yourself II

Extend the above exercise by including a second parameter in the function passing in the year.

Then, determine whether the year is a leap year or not and subsequently adjust the value of the number of days in February accordingly

Hint: assume all years divisible by 4 are leap years