

Homework One

The following guidelines should be followed and will be used to grade your homework:

- The code for each question should be implemented using Jupiter notebooks.
- All the code should be included in one single notebook (.ipynb file).
- **Make sure comments are available in the code. Otherwise, marks will be deducted.**
- Usage of these functions is allowed to check if a string or a character is numeric, alphanumeric, or digit. Use for your convenience as you see fit in your code.
 - `string.isnumeric()`: https://www.w3schools.com/python/ref_string_isnumeric.asp
 - `string.isalnum()`: https://www.w3schools.com/python/ref_string_isalnum.asp
 - `string.isdigit()`: https://www.w3schools.com/python/ref_string_isdigit.asp
- Sample runs shown in the question should be used as a guide for implementation. However extensive testing needs to be done on your code to deal with all test cases that might possibly be executed.
- No credit will be given to hardcoded test cases within the code.
- Please abide by your **academic integrity**. This is an **individual** homework assignment.
- No group submissions will be accepted.
- **You should name your “.ipynb” file using “FirstnameLastnameHW1”.**
- **You will get zero points if your program has syntax errors.**

Question 1

(3 pts) Taking the following rules into consideration:

- An integer, greater than 1, that is only divisible by 1 and itself is called a prime number.
- A composite number is a whole number with more than two integer divisors.
- All non-prime numbers greater than 1 are called composite numbers.
- The integers 0 and 1 are neither prime nor composite.
- A number cannot be both prime and composite.

Write a program that asks the user to input a positive integer. The program should:

- 1- Check if the value entered is represents a number. If not, the user is prompted to re-enter a valid number (the program should not exit).
- 2- Inform the user if the number is a prime number, a composite number or neither prime nor composite (the program should not exit).
- 3- Loop continuously asking the user if they wish to continue (yes/no). If no is entered, the program exits.

Hints:

- You need to use a loop. That is, you cannot import a library that has the prime function implemented and use it.
- Only usage of string.isnumeric(), string.isalnum(), string.isdigit() functions is permitted (see instructions page).
- If you use any other approach besides looping, no credit will be given.

Sample Interaction:

Please enter a positive integer: hello

This is not a valid positive integer value. Please re-enter a valid positive integer: -5

This is not a valid positive integer value. Please re-enter a valid positive integer: 5

The number you entered is a prime number. It is not a composite number.

Would you like to continue? (yes/no): yes

Please enter a positive integer: 6

The number you entered is not a prime number. It is a composite number.

Would you like to continue? (yes/no): yes

Please enter a positive integer: -1

This is not a valid positive integer value. Please re-enter a valid positive integer: 2

The number you entered is a prime number. It is not a composite number.

Would you like to continue? (yes/no): yes

Please enter a positive integer: 199

The number you entered is a prime number. It is not a composite number.

Would you like to continue? (yes/no): yes

Please enter a positive integer: 1

The number you entered is neither a prime nor a composite number.

Would you like to continue? (yes/no): yes

Please enter a positive integer: 0

The number you entered is neither a prime nor a composite number.

Would you like to continue? (yes/no): no

Question 2

(3 pts) We are going to implement the casting function `float()` that converts a float string to a float value.

Write a program that asks the user to enter a number. The program should:

- 1- Check if the value entered is numerical. If not, the user is prompted to re-enter a valid number (the program should not exit).
- 2- Return the float value of that string. **Display it to the user formatted to two decimal places.**
- 3- Loop continuously asking the user if they wish to continue (yes/no). If no is entered, the program exits.

Hints:

- You need to use a loop. That is, you cannot import a library that has the string-to-float function implemented and use it.
- Your code **must not call the built-in `float()` function for conversion or casting purposes**. We are trying to implement it here.
- Only usage of `string.isnumeric()`, `string.isalnum()`, `string.isdigit()` functions is permitted (see instructions page).
- If you use any other approach besides looping, no credit will be given.

Sample Interaction:

Please enter a positive float string: hello

This is not a valid positive float string. Please re-enter a valid positive float string: -12.1

This is not a valid positive float string. Please re-enter a valid positive float string: 23.4

The float value of your string is: 23.40

The class of the converted output is: <class 'float'>

Would you like to continue? (yes/no): yes

Please enter a positive float string: 15

The float value of your string is: 15.00

The class of the converted output is: <class 'float'>

Would you like to continue? (yes/no): yes

Please enter a positive float string: -6

This is not a valid positive float string. Please re-enter a valid positive string: 123.6

The float value of your string is: 123.60

The class of the converted output is: <class 'float'>

Would you like to continue? (yes/no): yes

Please enter a positive float string: 000

The float value of your string is: 0.00

The class of the converted output is: <class 'float'>
Would you like to continue? (yes/no): no

Question 3

(3 pts) A palindrome is a string, a word, phrase, or sequence that reads the same backward as forward, e.g., madam, kayak, noon, etc.

Write a program that asks the user to enter a string. The program should:

- 1- Prompt the user to input a string.
- 2- Inform the user if the word is a palindrome.
- 3- Ignore all whitespaces (left, right, and middle) in the input string.
- 4- Loop continuously asking the user if they wish to continue (yes/no). If no is entered, the program exits.
- 5- Test your Program using these values (make sure letter capitalization is the same): 'Radar', 'refer', 'Wow', 'dad'.

Hints:

- You need to use a loop. You cannot import a library that has the reverse() function or a ispalindrome() function implemented and use it.
- Usage of string slicing (as in **string[::-1]**) is also not permitted.
- If you use any other approach besides looping, no credit will be given.

Sample Interaction:

Please enter a string: hello
The string you entered is not a palindrome.
Would you like to continue? (yes/no): yes

Please enter a string: anna
The string you entered is a palindrome.
Would you like to continue? (yes/no): yes

Please enter a string: 12
The string you entered is not a palindrome.
Would you like to continue? (yes/no): yes

Please enter a string: 898
The string you entered is a palindrome.
Would you like to continue? (yes/no): yes

Please enter a string: Radar
The string you entered is not a palindrome.
Would you like to continue? (yes/no): yes

Please enter a string: Wow
The string you entered is not a palindrome.

Would you like to continue? (yes/no): yes

Please enter a string: racecar

The string you entered is a palindrome.

Would you like to continue? (yes/no): yes

Please enter a string: too hot to hoot

The string you entered is a palindrome.

Would you like to continue? (yes/no): no

Question 4

(3 pts) Write a program that asks the user to enter a string in binary and return the decimal value of that string.

The program should:

- 1- Prompt the user to input a string.
- 2- Returns the decimal value of that binary string.
- 3- Loop continuously asking the user if they wish to continue (yes/no). If no is entered, the program exits.
- 4- Test your Program using these values: '11011', '1015', '00100', 'hello'.

Hints:

- You are only allowed to use looping to compute the decimal value of a binary string.
- You are not allowed to use bin(number) method illustrated here:
 - <https://www.geeksforgeeks.org/binary-decimal-vice-versa-python/>
 - <https://www.educative.io/edpresso/what-is-the-python-bin-function>
- You cannot use a library that has the binary-to-decimal function implemented and use it.
- Only usage of string.isnumeric(), string.isalnum(), string.isdigit() functions is permitted (see instructions page).
- If you use any other approach besides looping, no credit will be given.

Sample Interaction:

Please enter a binary string: 101
The decimal value of your binary string is: 5.
Would you like to continue? (yes/no): yes

Please enter a binary string: 1011
The decimal value of your binary string is: 11.
Would you like to continue? (yes/no): yes

Please enter a binary string: hello
This is not a valid binary string. Please re-enter a valid binary string: -1001
This is not a valid binary string. Please re-enter a valid binary string: 11011
The decimal value of your binary string is: 27
Would you like to continue? (yes/no): yes

Please enter a binary string: 1023
This is not a valid binary string. Please re-enter a valid binary string: 110000
The decimal value of your binary string is: 48
Would you like to continue? (yes/no): no

Question 5

(3 pts) Write a program that computes property taxes according to the following rules:

- Property taxes are 2.5% of the value of the house.
- There is a depreciation factor that is a function of the age of the house:
 - 0% if house age is less than 10 years,
 - 5% if house age is 10 years or greater but less than 15 years,
 - 10% if house age is 15 years or greater but less than 25 years,
 - 15% if house age is 25 years or greater.
- There are no taxes if the value of the house is less than \$200K
- Total property tax value formula is:

$$\text{property tax} = \text{tax rate} * [\text{value of house} * (1 - \text{depreciation factor})]$$

The program should:

- 1- Prompt the user to enter house value and year the house is built.
- 2- Compute property taxes owed according to above rules and formula, and **display it to the user formatted to two decimal places (and a comma)**.
- 3- Loop continuously asking the user if they wish to continue (yes/no). If no is entered, the program exits.

Hints: To extract current year, you could either:

- Use the built-in datetime module in your code, as illustrated here:
 - <https://stackoverflow.com/questions/28189442/datetime-current-year-and-month-in-python>
 - <https://www.geeksforgeeks.org/python-program-to-print-current-year-month-and-day/>

```
from datetime import datetime
currentYear = datetime.now().year
```

- Have the current year set as a constant inside your code.

Sample Interaction:

Please enter the value of your property: 180000
Please enter the year the property is built: 2012
Property tax amount you owe is: \$ 0.00
Would you like to continue? (yes/no): yes

Please enter the value of your property: 400000
Please enter the year the property is built: 2013
Property tax amount you owe is: \$ 10,000.00
Would you like to continue? (yes/no): yes

Please enter the value of your property: 400000

Please enter the year the property is built: 2011
Property tax amount you owe is: \$ 9,500.00
Would you like to continue? (yes/no): yes

Please enter the value of your property: 400000
Please enter the year the property is built: 2004
Property tax amount you owe is: \$ 9,000.00
Would you like to continue? (yes/no): yes

Please enter the value of your property: 400000
Please enter the year the property is built: 1994
Property tax amount you owe is: \$ 8,500.00
Would you like to continue? (yes/no): no