

Introduction to Python

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IMP: For each piece of code, give a proper proof of correctness.

1. Write small codes to perform the following functions in python. For each of the following try running the program by 3 methods:
 - through the interactive shell by invoking python.
 - executing in the commandline through `python < filename >.py`
 - changing the permissions of `< filename >.py` so that it may be directly executed.
- (a) Given an integer n , check if it is prime (using Fermat's factorization method).
- (b) Given a positive integer n as input, generate a random number between $(0,n)$.
- (c) Given two integers n and m , find the HCF and LCM.
- (d) Given a list of integers, find:
 - The number with largest value.
 - The number with largest absolute value.
- (e) Given an input word, find the number of consonants and vowels in it.
- (f) Given 2 input words, find the characters which are common to both.
- (g) Given an input string, print the number of words in it. Inserting multiple spaces between words should not affect the result.

- (h) Given an input string, print the string formed after capitalizing the starting letter of each word. For example “This is an example sentence” should be converted to “This Is An Example Sentence”.

2. *Pig Latin Translator*

A group of Vatican City police officers are planning a trip to the United States. Since they only speak ‘Pig Latin’, they will need to translate a lot of English phrases. Write a Python program to perform basic English to Pig Latin translation according to the following translation rules.

Translation Rules:

- (a) If a word has no letters, don’t translate it.
- (b) All punctuation should be preserved.
- (c) If the word begins with a capital letter, then the translated word should too.
- (d) Separate each word into two parts. The first part is called the ‘prefix’ and extends from the beginning of the word up to, but not including, the first vowel. (The letter ‘y’ will be considered a vowel.) The rest of the word is called the ‘stem’. The Pig Latin text is formed by reversing the order of the prefix and stem and adding the letters ‘ay’ to the end. For example, ‘sandwich’ is composed of ‘s’ + ‘andwich’ + ‘ay’ + ‘.’ and would translate to ‘andwichsay’.
- (e) If the word contains no consonants, let the prefix be empty and the word be the stem. The word ending should be ‘yay’ instead of ‘ay’. For example, ‘I’ would be ‘Iyay’.

First write a program that takes an input string from the user and prints the corresponding Pig Latin translated string.

Extend the program to take the input from an input text file, and write the output to another file.