

Python Problems

1. Write a program that displays your name 10 times. Use a loop.
2. Write a program that reads a text file and outputs an exact copy to another file. Access the input and output file names from the command line.
3. Same as problem 2, but each line in the output file should be prefixed with its line number. The line number for each should occupy four spaces, right justified.
4. Write a program that executes a loop that prompts the user for a number, squares the entered number, and displays the square. Your loop should continue until the user enters 0.
5. Write a program that reads in 10 integers, appending each onto a list. It then displays the list from beginning to end using a loop, accessing each element via its index. Next, it displays the list from end to beginning using a loop, accessing each element via a negative index. Finally, it displays the list from end to beginning, accessing the elements of the list without using indices. *Hint*: Use the `pop()` method.
6. Write a function that is passed two lists. Your function should concatenate the elements of the second list onto the first list, and then return the modified first list. Write a program that tests your function.
7. Write a program that reads in a string and then displays its length.
8. Write a program which calls the function `getgrade()` repeatedly until `getgrade()` returns a valid grade. `getgrade()` should prompt for and read in from the keyboard an integer in the range 0 to 100 and return it to the caller. If, however, the grade entered is outside the range 0 to 100 inclusive, `getgrade()` should raise a `RuntimeError` exception, indicating an invalid grade was entered. When your program receives a valid grade from `getgrade()`, it should display in which quartile the grade is in: first (75-100), second (50-74), third (25- 49), or fourth (0-24).
9. Write a program that creates a dictionary whose key/value pairs are 'a'/1, 'b'/2, ..., 'z'/26. Then prompt for and read in a letter, and display its corresponding number value obtained from your dictionary.
10. Write a program that reads in 10 strings from the keyboard. Count the number of strings that start with 'pr'. Display this count. Use a loop.
11. Write a program that reads in a positive integer into `n`. Your program should then display `True` if `n` is a perfect number, and `False` otherwise. A *perfect number* is a number whose positive divisors excluding itself sum up to the given number. For example, the positive divisors of 6 excluding 6 are 1, 2, and 3. Because $1 + 2 + 3 = 6$, 6 is a perfect number.
12. Write a program that reads in a text file that consists of some standard English text. Your program should count the number of occurrences of each letter of the alphabet, and display each letter with its count, in the order of increasing count. What are the six most frequently used letters?
13. Write a program that reads in a string and determines if it is a palindrome (i.e., a string that reads the same backwards as forwards).
14. Write a program that computes the following sum: $2 + 1/2! + 1/3! + \dots + 1/100!$ Is the sum equal to

an important constant in mathematics? “!” denotes the factorial function. $n!$ is the product of the integers from 1 to n . For example, $5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$.

15. Write a program that reads in 10 numbers, placing each one on a linked list. Your program should then display each number by traversing the linked list using a loop and using recursion.
16. Write a program that reads in a positive integer into n . Your program should then sum up the first n positive odd numbers, and display the sum. What is the relation between the value of n and the computed sum?
17. Read in a positive number into x . Then execute the following statement 100 times:

```
x = math.sqrt(x)
```

Does the value of x converge on a particular number, regardless of its initial value? Try values both less than and greater than 1. To use `sqrt()`, import the `math` module.

18. Write a program that reads in a positive integer into n . Your program should then display n rows. Each row should have consecutive integers starting from 1, and have one more integer than the preceding row. The first row should contain only 1. For example, if 3 is entered, then your program should display

```
1
1 2
1 2 3
```