

Programming Exercises Python Telesko

Chapter 2 Input, Processing, and Output

1. Personal Information

Write a program that displays the following information:

- Your name
- Your address, with city, state, and ZIP
- Your telephone number
- Your college major

2. Sales Prediction

A company has determined that its annual profit is typically 23 percent of total sales. Write a program that asks the user to enter the projected amount of total sales, then displays the profit that will be made from that amount.

Hint: Use the value 0.23 to represent 23 percent.

5. Distance Traveled

Assuming there are no accidents or delays, the distance that a car travels down the interstate can be calculated with the following formula:

Distance = Speed * Time

A car is traveling at 70 miles per hour. Write a program that displays the following:

- The distance the car will travel in 6 hours
- The distance the car will travel in 10 hours
- The distance the car will travel in 15 hours

8. Tip, Tax, and Total

Write a program that calculates the total amount of a meal purchased at a restaurant. The program should ask the user to enter the charge for the food, then calculate the amounts of a 18 percent tip and 7 percent sales tax. Display each of these amounts and the total.

11. Male and Female Percentages

Write a program that asks the user for the number of males and the number of females registered in a class. The program should display the percentage of males and females in the class.

Hint: Suppose there are 8 males and 12 females in a class. There are 20 students in the class. The percentage of males can be calculated as $8 \div 20 = 0.4$, or 40%. The percentage of females can be calculated as $12 \div 20 = 0.6$, or 60%.

ter1. Converting a decimal number into a binary number

Write a program that asks the user for an integer and converts this integer into a binary number.

Example: 10 -> 00001010

Hint: There exist different ways for implementation.

Chapter 3: Decision Structures and Boolean Logic

1. Day of the Week

Write a program that asks the user for a number in the range of 1 through 7. The program should display the corresponding day of the week, where 1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday, and 7 = Sunday. The program should display an error message if the user enters a number that is outside the range of 1 through 7.

3. Age Classifier

Write a program that asks the user to enter a person's age. The program should display a message indicating whether the person is an infant, a child, a teenager, or an adult.

Following are the guidelines:

- If the person is 1 year old or less, he or she is an infant.
- If the person is older than 1 year, but younger than 13 years, he or she is a child.
- If the person is at least 13 years old, but less than 20 years old, he or she is a teenager.
- If the person is at least 20 years old, he or she is an adult.

6. Magic Dates

The date June 10, 1960, is special because when it is written in the following format, the month times the day equals the year:

6/10/60

Design a program that asks the user to enter a month (in numeric form), a day, and a two-digit year. The program should then determine whether the month times the day equals the year. If so, it should display a message saying the date is magic. Otherwise, it should display a message saying the date is not magic.

12. Software Sales

A software company sells a package that retails for \$99. Quantity discounts are given according to the following table:

Quantity	Discount
10–19	10%
20–49	20%
50–99	30%
100 or more	40%

Write a program that asks the user to enter the number of packages purchased. The program should then display the amount of the discount (if any) and the total amount of the purchase after the discount.

14. Body Mass Index

Write a program that calculates and displays a person's body mass index (BMI). The BMI is often used to determine whether a person is overweight or underweight for his or her height. A person's BMI is calculated with the following formula:

$$\text{BMI} = \text{weight} / \text{height}^2$$

where weight is measured in kilos and height is measured in meter. The program should ask the user to enter his or her weight and height, then display the user's BMI. The program should also display a message indicating whether the person has optimal weight, is underweight, or is overweight. A person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI value is greater than 25, the person is considered to be overweight.

16. February Days

The month of February normally has 28 days. But if it is a leap year (Schaltjahr), February has 29 days. Write a program that asks the user to enter a year. The program should then display the number of days in February that year. Use the following criteria to identify leap years:

1. Determine whether the year is divisible by 100. If it is, then it is a leap year if and only if it is also divisible by 400. For example, 2000 is a leap year, but 2100 is not.
2. If the year is not divisible by 100, then it is a leap year if and only if it is divisible by 4. For example, 2008 is a leap year, but 2009 is not.

Here is a sample run of the program:

Enter a year: 2008

In 2008 February has 29 days.

ter1. Rewriting grader.py

Rewrite `grader.py` (see chapter 3 programs) by using

- Version 1: the `elif` statement
- Version 2: the `match / case` statement (is a “switch”-like statement available from v3.10 on)

Chapter 4: Repetition Structures

2. Calories Burned

Running on a particular treadmill you burn 4.2 calories per minute. Write a program that uses a loop to display the number of calories burned after 10, 15, 20, 25, and 30 minutes.

3. Budget Analysis

Write a program that asks the user to enter the amount that he or she has budgeted for a month. A loop should then prompt the user to enter each of his or her expenses for the month and keep a running total. When the loop finishes, the program should display the amount that the user is over or under budget.

6. Celsius to Fahrenheit Table

Write a program that displays a table of the Celsius temperatures 0 through 20 and their Fahrenheit equivalents. The formula for converting a temperature from Celsius to Fahrenheit is

$$F = 9/5 * C + 32$$

where F is the Fahrenheit temperature, and C is the Celsius temperature. Your program must use a loop to display the table.

8. Sum of Numbers

Write a program with a loop that asks the user to enter a series of positive numbers. The user should enter a negative number to signal the end of the series. After all the positive numbers have been entered, the program should display their sum.

15. Write a program that uses nested loops to draw this pattern:

```
##
# #
#  #
#   #
#    #
#     #
#      #
```

Chapter 5: Functions

1. Kilometer Converter

Write a program that asks the user to enter a distance in kilometers, then converts that distance to miles. The conversion formula is as follows:

$$\text{Miles} = \text{Kilometers} * 0.6214$$

4. Automobile Costs

Write a program that asks the user to enter the monthly costs for the following expenses incurred from operating his or her automobile: loan payment, insurance, gas, oil, tires, and maintenance. The program should then display the total monthly cost of these expenses, and the total annual cost of these expenses.

11. Math Quiz

Write a program that gives simple math quizzes. The program should display two random numbers that are to be added, such as:

$$\begin{array}{r} 247 \\ + 129 \end{array}$$

The program should allow the student to enter the answer. If the answer is correct, a message of congratulations should be displayed. If the answer is incorrect, a message showing the correct answer should be displayed.

12. Maximum of Two Values

Write a function named `max` that accepts two integer values as arguments and returns the value that is the greater of the two. For example, if 7 and 12 are passed as arguments to the function, the function should return 12. Use the function in a program that prompts the user to enter two integer values. The program should display the value that is the greater of the two.

17. Prime Numbers

A prime number is a number that is only evenly divisible by itself and 1. For example, the number 5 is prime because it can only be evenly divided by 1 and 5. The number 6, however, is not prime because it can be divided evenly by 1, 2, 3, and 6. Write a Boolean function named `is_prime` which takes an integer as an argument and returns true if the argument is a prime number, or false otherwise. Use the function in a program that prompts the user to enter a number then displays a message indicating whether the number is prime.

Chapter 6: Introduction to File Input and Output

1. File Display

Assume a file containing a series of integers is named `numbers.txt` and exists on the computer's disk. Write a program that displays all of the numbers in the file.

4. Item Counter

Assume a file containing a series of names (as strings) is named `names.txt` and exists on the computer's disk. Write a program that displays the number of names that are stored in the file.

Hint: Open the file and read every string stored in it. Use a variable to keep a count of the number of items that are read from the file.

5. Sum of Numbers

Assume a file containing a series of integers is named `numbers.txt` and exists on the computer's disk. Write a program that reads all of the numbers stored in the file and calculates their total.

7. Random Number File Writer

Write a program that writes a series of random numbers to a file. Each random number should be in the range of 1 through 500. The application should let the user specify how many random numbers the file will hold.

Chapter 7: Lists and Tuples

1. Total Sales

Design a program that asks the user to enter a store's sales for each day of the week. The amounts should be stored in a list. Use a loop to calculate the total sales for the week and display the result.

2. Lottery Number Generator

Design a program that generates a seven-digit lottery number. The program should generate seven random numbers, each in the range of 0 through 9, and assign each number to a list element. (Random numbers were discussed in Chapter 5.) Then write another loop that displays the contents of the list.

4. Number Analysis Program

Design a program that asks the user to enter a series of 20 numbers. The program should store the numbers in a list then display the following data:

- The lowest number in the list
- The highest number in the list
- The total of the numbers in the list
- The average of the numbers in the list

6. Larger Than n

In a program, write a function that accepts two arguments: a list, and a number n . Assume that the list contains numbers. The function should display all of the numbers in the list that are greater than the number n .

Chapter 8: More About Strings

1. Initials

Write a program that gets a string containing a person's first, middle, and last names, and displays their first, middle, and last initials. For example, if the user enters John William Smith, the program should display J. W. S.

2. Sum of Digits in a String

Write a program that asks the user to enter a series of single-digit numbers with nothing separating them. The program should display the sum of all the single digit numbers in the string. For example, if the user enters 2514, the method should return 12, which is the sum of 2, 5, 1, and 4.

6. Average Number of Words

If you have downloaded the source code from the Computer Science Portal you will find a file named `text.txt` in the Chapter 08 folder. The text that is in the file is stored as one sentence per line. Write a program that reads the file's contents and calculates the average number of words per sentence.

8. Sentence Capitalizer

Write a program with a function that accepts a string as an argument and returns a copy of the string with the first character of each sentence capitalized. For instance, if the argument is "hello. my name is Joe. what is your name?" the function should return the string "Hello. My name is Joe. What is your name?" The program should let the user enter a string and then pass it to the function. The modified string should be displayed.

10. Most Frequent Character

Write a program that lets the user enter a string and displays the character that appears most frequently in the string.

Chapter 9: Dictionaries and Sets

2. Capital Quiz

Write a program that creates a dictionary containing states as keys, and their capitals as values. (Use the Internet to get a list of the states and their capitals.) The program should then randomly quiz the user by displaying the name of a state and asking the user to enter that state's capital. The program should keep a count of the number of correct and incorrect responses.

4. Unique Words

Write a program that opens a specified text file then displays a list of all the unique words found in the file.

Hint: Store each word as an element of a set.

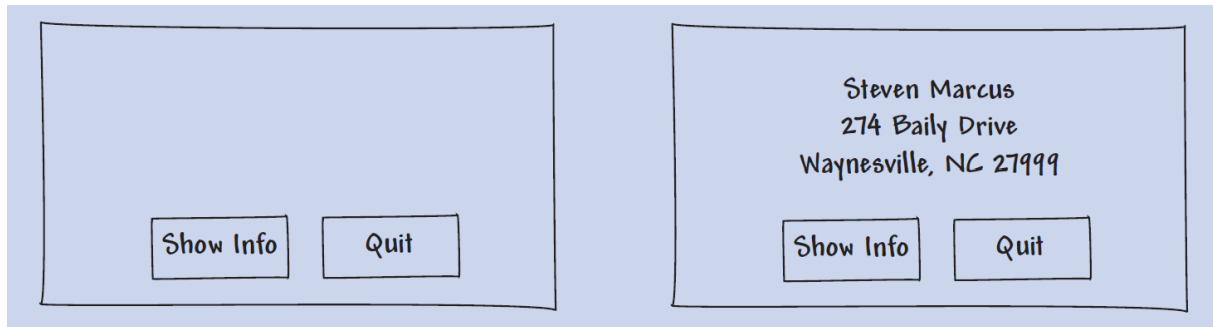
5. Word Frequency

Write a program that reads the contents of a text file. The program should create a dictionary in which the keys are the individual words found in the file and the values are the number of times each word appears. For example, if the word "the" appears 128 times, the dictionary would contain an element with 'the' as the key and 128 as the value. The program should either display the frequency of each word or create a second file containing a list of each word and its frequency.

Chapter 13:

1. Name and Address

Write a GUI program with Tkinter that displays your name and address when a button is clicked. The program's window should appear as the sketch on the left side of the figure below when it runs. When the user clicks the Show Info button, the program should display your name and address, as shown in the sketch on the right of the figure.



4. Celsius to Fahrenheit

Write a GUI program using Tkinter that converts Celsius temperatures to Fahrenheit temperatures. The user should be able to enter a Celsius temperature, click a button, then see the equivalent Fahrenheit temperature. Use the following formula to make the conversion:

$$F = 9/5 * C + 32$$

F is the Fahrenheit temperature, and C is the Celsius temperature. Cover exception handling when entering invalid Celsius input!