

Additional Programming Exercises

Note: *These are alternative programming exercises provided by our textbook. I don't expect you to solve all of these problems when studying, but you can think about how you might go about solving these types of problems.*

Chapter 1

1. Write a program that uses a for loop to print the sentence "Hello, Python!" ten times
2. Write a program that prints the integers from 0 to 9.
3. Write a program that prints the integers from 0 to 10.
4. Write a program that prints the even integers from 2 to 20.
5. Write a program that prints the squares of the integers from 1 to 10.

Chapter 2

1. Write a program that prompts for the user's first name and stores it in a variable named `first_name`. Do the same for the last name, using the variable name `last_name`. Then, use string concatenation (see section 2.3) to greet them with their full name.

Example:

```
What is your first name? George
What is your last name? Washington
Hello, George Washington!
```

2. Print a list of your favorite foods by using a for loop. Your code should look something like this:

```
def main():
    for food in ???:
        print food
```

```
main()
```

Your job is to replace the ??? with a proper Python expression, such that the output will

```
be:
Apples
Cookies
Ice Cream
Steak
Of course, your list might be different. :-)
```

3. The Mars Curiosity rover takes photos of the Mars surface, and then transmits them to NASA at the speed of light. Light travels at about 186,000 miles per second. Write a program to calculate how long it takes a photo from Curiosity to reach NASA when Mars is at its closest orbit to Earth, a distance of about 34 million miles.
4. Write a program that prompts for four parts of speech, and use those to generate a funny sentence.

Example:

Enter a noun: pillow

Enter a verb: whirl

Enter an adjective: fancy

Enter a place: stadium

Take your fancy pillow and whirl it at the stadium!

Chapter 3

1. The `math.pow(x,y)` function returns the value of `x` raised to the `y` power. For example, `math.pow(2,3)` returns 8.0. Write a program that prompts for the `x` and `y` values, and outputs the result of calling `math.pow(x,y)`.
2. Congratulations, you are the new owner of a local coffee shop! Just one problem—your employees take four minutes to serve each customer. You peer out from the storeroom and notice that the line is getting long. Write a program that prompts for the number of people currently in line, and outputs the time it will take to serve everyone who's waiting.
3. A bicycle shop sells bikes and helmets. Some people already own helmets, so on average the shop sells one helmet for every five bicycles. Helmets cost \$50 and bikes cost \$250. Write a program that prompts for the number of bikes that the shop expects to sell over the next month and outputs the total amount of expected revenue.
4. There's a famous puzzle intended to demonstrate the surprising growth of exponentiation sequences, sometimes called the "Wheat and chessboard problem": If a chessboard were to have wheat placed upon each square such that one grain were placed on the first square, two on the second, four on the third, and so on (doubling the number of grains on each subsequent square), how many grains of wheat would be on the chessboard at the finish? There are 64 squares on a chess board. Write a program that uses a for loop and an accumulator to calculate the answer to this classic problem.
5. You've been hired to help write the software for an automatic change dispenser, the kind you see attached to a cash register, that automatically dispenses the right coins depending on

the amount of change that's owed to the customer. Write a program that first prompts for a number from 0 to 99 (representing the amount of change that's due) and then outputs the number of quarters, dimes, nickels, and pennies that should be dispensed. (Hint: Use the `//` operator to perform integer division and the `%` operator to determine the remainder.)

Chapter 4

1. Draw the axes and labels for a standard four-quadrant coordinate system. The scale is up to you, but you should draw tick marks on both axes at 10% intervals. Use as much of the screen as you can.
2. Draw a game board for playing chess or checkers. It's a simple grid of 8x8 squares, in which the squares alternate between two colors and the starting color in each row alternates as well, so that you end up with a checkerboard pattern. (Google for a chess board image if you're unsure.)

Chapter 5

1. Write a program that reads a file containing a list of numbers, and displays the sum.
2. Write a program that can report the number of times a certain letter appears in a string. Prompt the user for the string and the letter to search for and display the number of times that letter appears.
3. Write a program that can report the number of times a certain word appears in a file. Prompt the user for the filename and the word to search for and display the number of times the word appears in the file.

Chapter 6

1. Write a function that calculates the distance in miles between two cities, given the latitude and longitude coordinates of each. Then, write a program that prompts for the coordinates of two cities, uses the function to calculate the distance, and outputs the result. Think about what kind of rounding accuracy might be appropriate.

Chapter 7

1. Credit card numbers follow a standard system. For example, Visa, MasterCard, and Discover Card all have 16 digits, and the first digit serves to indicate the card brand. All Visa cards start with a 4; MasterCard cards always starts with a 5; and Discover cards start with a 6. Write a program that prompts for a credit card and emits the name of the brand. If the card brand cannot be determined, the program should output "Unknown Card."
2. On the NASA Space Shuttle, three computers were in use simultaneously. Computations were performed by all three computers, and the result of each computation was put to a vote. If at least two of the computers provided the same result, that result was then used. But if all three computers each provided a different result, then the computation was discarded. Write a program which prompts for three different numbers, as a simulation of three different computational results. If at least two of the inputs are the same, your program should output that value. If all three inputs are different, output the word "ERROR" instead.
3. In congress, members typically vote electronically. A bill requires a simple majority of "Yea" votes (more than 50%) to pass. There are 435 members in the House of Representatives and 100 in the Senate. Write a function that declares two parameters: the number of "Yea" votes, and which house is voting (the House of Representatives or the Senate) and returns the value True if the bill received enough votes to pass, and False if it did not.
4. Password security is important these days. The longer a password is, the harder it is to guess. Write a program that helps users evaluate the strength of their favorite password. Passwords that are at least 12 characters long should be given a "very strong" rating; 8–12 characters are "moderately strong"; and anything less than 8 character should be rated as "Weak."
5. Phone numbers in the US consist of 10 digits, sometimes formatted with punctuation. Write a program that prompts for a phone number, and determines whether or not it is a valid 10-digit number by ignoring any punctuation.