

## Chapter 3 Selections - Chapter 4 Characters and Strings - Chapter 5 Loops

### **Program # 1** (Exercise 3.5 p.109 Find future dates)

Write a program that prompts the user to enter an integer for today's day of the week (Sunday is 0, Monday is 1, ..., and Saturday is 6). Also prompt the user to enter the number of days after today for a future day and display the future day of the week.

Here is a sample run:

```
Enter today's day: 1 <Enter>
Enter the number of days elapsed since today: 3 <Enter>
Today is Monday and the future day is Thursday

Enter today's day: 0 <Enter>
Enter the number of days elapsed since today: 31 <Enter>
Today is Sunday and the future day is Wednesday
```

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### **Program # 2** (Exercise 3.17 p.111 Game: scissor, rock, paper)

Write a program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws.

Here are sample runs:

```
scissor (0), rock (1), paper (2): 1 <Enter>
The computer is scissor. You are rock. You won

scissor (0), rock (1), paper (2): 2 <Enter>
The computer is paper. You are paper too. It is a draw
```

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### **Program # 3** (\*\*Exercise 3.21 p.112 Science: day of the week)

Zeller's congruence is an algorithm developed by Christian Zeller to calculate the day of the week. The formula is

$$h = \left( q + \frac{26(m+1)}{10} + \frac{k}{4} + \frac{j}{4} + 5j \right) \% 7$$

where

- h is the day of the week (0: Saturday, 1: Sunday, 2: Monday, 3: Tuesday, 4: Wednesday, 5: Thursday, 6: Friday).
- q is the day of the month.
- m is the month (3: March, 4: April, ..., 12: December, January and February are counted as months 13 and 14 of the previous year).
- j is the century (i.e., year / 100).
- k is the year of the century (i.e., year % 100).

Note that the division in the formula performs an integer division. Write a program that prompts the user to enter a year, month, and day of the month, and displays the name of the day of the week. Here are some sample runs:

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### **Program # 4** (Exercise 4.24 p.156 Order three cities)

Write a program that prompts the user to enter three cities and displays them in ascending order.

Here is a sample run:

```
Enter the first city: Chicago <Enter>
Enter the second city: Los Angeles <Enter>
Enter the third city: Atlanta <Enter>
The three cities in alphabetical order are Atlanta Chicago Los Angeles
```

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**Program # 5** (Exercise 5.17 p.193 Display pyramid)

Write a program that prompts the user to enter an integer from 1 to 15 and displays a pyramid, as shown in the following sample run:

```
Enter the number of lines: 7 <Enter>
      1
     2 1 2
    3 2 1 2 3
   4 3 2 1 2 3 4
  5 4 3 2 1 2 3 4 5
 6 5 4 3 2 1 2 3 4 5 6
 7 6 5 4 3 2 1 2 3 4 5 6 7
```

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**Extra Exercise** (Math Olympiad)

Write a program that displays a series of numbers as shown in the followings:  
1, 3, 3, 6, 7, 9, ..., 12, 21, ...

See the explanation of algorithm to solve this problem is at:

<https://www.youtube.com/watch?v=vO-B7cihkxM> or [goo.gl/fDzr55](https://goo.gl/fDzr55)

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