Reminder regarding intellectual responsibility: For this assignment, the work you submit should be completely your own. Do not look at anyone else’s code, and do not show your code to anyone (except for the Instructors and this semester’s COSC-111 TAs). Do not discuss the assignment with other students (in this course or not), except for the Moodle forum. All questions should be posted on the Moodle forums, so everybody can be on the same page.

1 The game is afoot

A scavenger hunt awaits you! You will write a program that performs certain calculations (on year numbers) in order to follow the clues. The program’s calculations are described below, instructions for writing the program are in Section 2.1, and the starting clue is then provided in Section 2.2. The last page of this document shows a map that divides the campus into a coordinate grid that will allow you to figure out where to go at each step of the hunt. Rotate the page by 90 degrees clockwise so that the numbers appear straight.

The calculations: To perform this hunt, you will be finding clues in the form of 4-digit year numbers. These are (with the exception of the very first starting clue) years that you will find on buildings and statues on campus, so you can assume that they are between 1820 and 2018. Each year number will be an input to a program that performs an unnecessarily complicated calculation that yields coordinates. Using the attached map, you will go to those coordinates to find the next year-number clue.

Part of the calculation performed by this program depends on whether the given year is a leap year, as determined by these rules:

- If it is a multiple of 4, then it is a leap year, unless …
- If it is a multiple of 100, then it is not a leap year, unless …
- If it is a multiple of 400, then it is a leap year.

Therefore, 1924 was a leap year, but 1900 was not, yet 2000 was.

Once your program determines whether the given year is a leap year, it can then apply the correct one of the following two calculations to produce coordinates:

- If the year is a leap year, then:
  - The \( x \) coordinate is the absolute value of the difference between the first two digits and the last two digits of the number (e.g., if the year is 1908, the first two digits are “19” and the last two digits are “08”, so the \( x \) coordinate is \( 19 - 8 = 11 \)).
  - To obtain the \( y \) coordinate, first divide the year by 4. Then add 1 to the sum of the first and last digits of that result. Finally, divide by 2.
• If the year is not a leap year, then:
  
  – To obtain the x coordinate, first sum all the digits, and then:
    * If that sum is a multiple of 7, then divide by 3 and add 1.
    * If the sum is not a multiple of 7 but is greater than 10, then divide the sum by 3 and then add 7.
    * If the sum is not a multiple of 7 and is not greater than 10, then add 7 to that sum.
  
  – To get the y coordinate, first check if the year number is divisible by its first two digits or the first digit is not divisible by the last digit. If either of those conditions holds, the y coordinate is one less than the result when the last 2 digits are divided by the first 2 digits. If neither condition holds, subtract the square of the first digit from the last two digits.

2 Your assignment

2.1 Getting started

Open a terminal, create a directory for this project, change into it, and grab some starting source code:

```bash
$ mkdir project-01
$ cd project-01
$ emacs ScavengerHunt.java &
```

Complete the ScavengerHunt program so that it takes a year number as input, performs the calculation described in Section 1, and emits the coordinates that it calculates. When you run the program, your output should look something like:

```
[mriondato@romulus project-01] $ java ScavengerHunt
Enter the year: 1908
11 6
```

If you check the map, you will find that those coordinates lead you to Charles Pratt Dormitory. As an additional test, the year 1933 should provide coordinates to Valentine Hall.

2.2 Hunt!

To begin, enter the year 3232. That should yield coordinates on the map, and you should go to that place. At each location there is a sign with a date on it (if there are multiple dates, use the first 4-digit year that appears). There are six locations to find, including this first one. At the fifth location, go into the building and find and write down a (short) fun fact. Once you reach the sixth and final location, send an email to Matteo (mriondato@amherst.edu) with subject “[COSC111] Scavenger Hunt”, listing all the coordinates, years and locations you found, and
your fun fact. The two correct sequences of coordinates, years, and building with the most interesting fun facts will receive prizes.

You are **not** required to actually complete the hunt (after all, it's early March and running around campus in the cold may not seem all that palatable). However, you **are** responsible for ensuring that your code works properly in all cases, so make sure you test it thoroughly! Actually doing the scavenger hunt will ensure that each case of your code gets tested at least once.

### 3 Submitting your work

Submit your `ScavengerHunt.java` source code file with the CS submission system, using one of the two methods:

- **Web-based:** Visit [the submission system web page](#).
- **Command-line based:** Use the `cssubmit` command at your shell prompt.