CS 46A Homework 2

Overview
In this assignment, you'll demonstrate your ability to use methods from classes to manipulate dates, strings, and other output to the terminal.

Learning Outcomes
By the end of this assignment, you should be able to write a simple Java program to …

- … call existing methods from a class
- … manipulate strings and sample some of their statistics.

Guidelines

1. Use BlueJ to create your code.
2. You must name your classes exactly as specified. Otherwise Codecheck will not be able to process your submission and you will get no credit.
3. When you are finished with your code, submit it to Codecheck one final time then download the `.signed.zip` file.
4. You must upload all three `signed.zip` files together to Canvas and you should double check the files in Canvas to make sure all three zip files are uploaded.
5. Do not open the downloaded zip files. The files are digitally signed, and the grader program will check that they have not been opened.

Problem 2A

Codecheck Link: HERE

Goal:
Write a program to print the date and calculate a few statistics about the date February 10, 2023. In particular, your program should print the following statistics:

```
Today is 2023-10-23.
The first day of Spring Break is 2023-03-25.
There are 45 days until Spring Break.
The date of 23 days ago is:
    Year : 2023
    Month: 1
    Day  : 18
```

Note that the program will display different dates when the program is run on different days, and you will get the dates on the server where Codecheck is running, which may be one day later than the date in San José if you run the program late at night.

Instructions:
Start a new BlueJ project called hw2a in the cs46a/homework/hw02 folder. In the BlueJ project, create a class called **Day** and copy the code from Canvas. Do not change this class in any way. Next, create another class called **DayProg** (there is not starter code provided for this exercise) and use the following instructions to write the `main()` method.

1. Create a Day object for today
2. Display today's date using the object
3. Create another Day object for the first day of Spring Break on March 25, 2023
4. Display the date for the first day of Spring Break using the object
5. Call a method on the object for the first day of Spring Break to find out the number of days to the first day of Spring Break from today and store it in a variable
6. Display the number of days using the variable
7. Call a method on the object for today to change it to the date 23 days ago
8. Call methods on the object for today to display the year, month, and day of the date 23 days ago
9. Modify the application to generate the output as shown above.

Problem 2B

Codecheck Link: HERE

Goal:

Write a program to manipulate a string and print some statistics about the string. In particular, generate a program to print the following output for the string "February is Black History Month":

```
The given string: February is Black History Month
The length: 31
The character at index 0: F
The size 5 substring starting at index 0: Febru
ALL UPPER CASE: FEBRUARY IS BLACK HISTORY MONTH
all lower case: february is black history month
all lower case with spaces removed: februaryisblackhistorymonth
The original word with ' ' replaced by '_': February_is_Black_History_Month
```

Instructions:

Start a new BlueJ project called hw2b in the cs46a/homework/hw02 folder. In the project, create a new class called **`BlackHistoryMonth`**. Then, copy the BlackHistoryMonth.java file from the files provided on Canvas to your hw2b folder. Then, edit the code to print the output as described above.

Tips and Guidelines

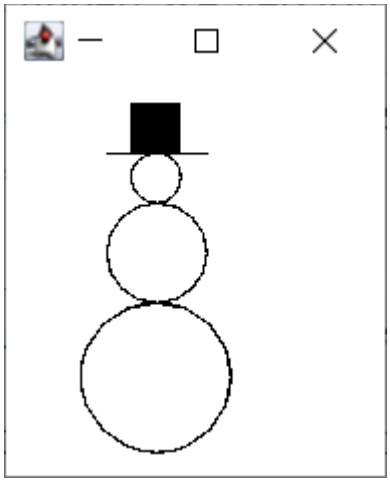
- Three variables with initial values are given to you, and you should use the variables in your code when displaying the messages, since Codecheck will use different values to test your program.
- Use method charAt() to get the character at the specified index position.
- Remember that all the String methods are accessors, meaning they do not change the original String object.
- You could declare additional local variables to store some values to make it easier for you.
- Use print() and println() together if you need to split commands across lines.

Problem 2C

Codecheck Link: HERE

Goal:

Write a program to call methods from the existing `graphics` package. Specifically, write a program to display a snowman image as follows:



Instructions:

Create a new BlueJ project called hw2c in the cs46a/homework/hw02 folder and create a new class **`SnowmanViewer`**. Following the same steps as in Homework 1 Problem 1C, import the Horstmann graphics package. Next, follow the steps below to draw the picture:

1. Draw a rectangle of size 20 x 20 as the hat at position (50, 10).
2. Fill the hat with the default black color.
3. Draw a line for the hat brim at the bottom of the hat extending 10 pixels further on each side. You will need to figure out the position of the line.
4. Draw a circle of diameter 20 at position (50, 30).
5. Draw a circle of diameter 40 at position (40, 50).
6. Draw a circle of diameter 60. You need to figure out the position of the final circle.

Tips and Guidelines:

- All positions are the upper-left corner of the objects (rectangle, line, and circle).