CS 1400 - Assignment #8

Maximum Points: 20 pts

Topics:

- Recursion

Coding Guideline (You will be graded on this)

1) Give identifiers semantic meaning and make them easy to read (examples numStudents, grossPay, etc).
2) Keep identifiers to a reasonably short length.
3) Use uppercase for constants. Use upper camel case for classes. Use lower camel case for all other identifiers (variables, methods, objects).
4) Use tabs or spaces to indent code within blocks (code surrounded by braces). This includes classes, methods, and code associated with ifs, switches and loops. Be consistent with the number of spaces or tabs that you use to indent.
5) Use white space to make your program more readable.
6) Use comments to explain how the parts of your program work.

Important Note: All submitted assignments must begin with a descriptive block comment (multi-line comments) similar to the one shown below. It must contain your name and the other information illustrated. To avoid losing trivial points, make sure this comment header is included in every assignment you submit, and that it is updated accordingly from assignment to assignment.

```
/*----------------------------------------------------------------------------
// AUTHOR: YOUR NAME
// FILENAME: TITLE OF THIS SOURCE FILE
// SPECIFICATION: DESCRIPTION OF THIS PROGRAM
// FOR: CS 1400 - ASSIGNMENT #8
// TIME SPENT: HOW LONG IT TOOK YOU TO FINISH THIS ASSIGNMENT
//*/
```

Program Description

Write a class definition (not a driver program, there is no main method) named Geek2 (saved in a file Geek2.java) that models a geek person who only solves problems by using **recursion**. The class has a default constructor and many static methods specified in the table below. (If your class does not contain any of the following methods, points will be deducted.)

Class/Methods Specifications

Method	Description of the Method
public static boolean find(String str, String match)	Tests whether match is contained in str. Hint: if str starts with match, then you are done. If not, consider the string that you obtain by removing the first character (smaller problem).
public static int digitSum(int n)	Computes the sum of the digits of a number. Hint: the digit sum of 1729 is directly related to the digit sum of 172 (a smaller problem). You just need to add the last digit (9) and you are done.
public static int pow(int a, int n)	Computes a^n, where n is a positive integer. Hint: if n is 1, then a^n = a, otherwise a^n = a * a^{n-1} (a smaller problem).
public static int smallestDigit(int number)	Finds the smallest digit in a number. Hint: the smallest digit in a number is the minimum of [the first digit, the minimum from the rest - excluding the first digit (a smaller problem)]. You may want to convert the parameter number to a String to find the subsets.
public static String reverse(String text)	Reverses a string, for example, "Hello!" becomes "!olleH". Hint: remove the first character, reverse the remaining text (a smaller problem), and combining the two.

Use the following program stored in Assignment8.java, which has the main method to create new Geek2 objects and to test your class. **You do NOT need to modify Assignment8.java.** Assignment8.java will ask a user to enter one of the following commands. Based on the user's choice, the program needs to perform corresponding operation. This will be done by using a method you defined in the Geek2 class. The program will terminate when the user enters 'q'.

Here is a sample output: Input is in RED

```
Command Options
------------------------------------------------------------
a: tests whether match is contained in str
b: computes the sum of the digits of a number
c: computes a^n, where n is a positive integer
d: finds the smallest digit in a number
e: reverses a string
q: quit

Please enter a command
a
Please enter a string
program
Please enter a substring
gra

gra is contained in program
```

Please enter a command
b
Please enter a number
62856

The sum of the digits of 62856 is 27

Please enter a command
c
Please enter a number
3
Please enter another number
4

3 to the power of 4 is 81

Please enter a command
d
Please enter a number
37297

The smallest digit in 37297 is 2

Please enter a command
e
Please enter a string
house

The reverse of house is esuoh

Please enter a command
a
Please enter a string
student
Please enter a substring
det

det is not contained in student

Please enter a command
b
Please enter a number
1000

The sum of the digits of 1000 is 1

Please enter a command
q
Bye!

Helpful hints for doing this assignment:

- work on it in steps – write one method, test it with a test driver and make sure it works before going on to the next method
- always make sure your code compiles before you add another method
- your methods should be able to be called in any order

Submit your homework by following the instructions below:

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- Submit your **Assignment8.java** and **Geek2.java** file on GradeScope. Your assignment will be graded only if it is submitted there, NOT on Canvas or sent by email.
- Gee2k.java file should have the following, in order:
  - In comments, the assignment Header described and demonstrated in "Important Note".
  - The working Java code requested in “Problem Description”.
- The Assignment8.java file must compile and run as you submit it

Important Note: You may resubmit as many times as you like until the deadline. Only your last submission will be considered.

NO LATE ASSIGNMENTS WILL BE ACCEPTED. ALWAYS SUBMIT WHATEVER YOU HAVE COMPLETED FOR PARTIAL CREDIT BEFORE THE DEADLINE!