

Java for Non Majors

CGS 3416: Spring 2016

Homework 4: 100 points (and 50 extra credit points)

Due date: 11:59 PM 02/25/2016

Objective

The purpose of this assignment is to test your proficiency with Java loops. It will also serve to check if you can integrate older concepts with newer ones.

For this assignment you are required to write two programs. Please email your files "DrawX.java" and "Primes.java" to jayarama@cs.fsu.edu

Problem 1 - X marks the spot

Deadpool has located Francis Freeman's compound (every action movie villain has to have one). He has successfully taken him out, but wants his friend Colossus to destroy the evidence by smashing up the place. However, Colossus is busy watching Better Call Saul and can't be bothered to help right now. So, he asks Deadpool to draw an 'X' on the roof of the compound and he will go in and smash later. Since other roofs could potentially have an 'X' on them, they have agreed on a few rules. The 'X' would be drawn using the '#' character and would have a height, measured in '#' characters that they have agreed upon. Deadpool then recruits you to do the drawing.

Specifications

- This program is worth 50 points, and is called `DrawX.java`.
- Create a class with the appropriate name. All of the code should be in the main method. (5 points)
- Accept the height of the 'X' from the user. This has to be an odd number. If the user enters an even number, go back and ask them for a new number. Repeat until you get an odd number. (10 points)
- Once you have the height of the 'X', use `for` loops to draw out the 'X' using the '#' character. (30 points)
- Please include comments wherever appropriate. (5 points)

Sample Runs

Regular text is what's printed by your program. Underlined text is user input, shown here as a sample. You will not be printing the underlined parts in your program.

Sample Run 1

```
Please enter the height of the X: 8
Error! The height should be an odd number.
Please enter the height of the X: 6
Error! The height should be an odd number.
Please enter the height of the X: 5
```

```
#  #
#  #
#
#  #
#  #
```

Sample Run 2

Please enter the height of the X: 7

```
#   #
#   #
#  #
#
#  #
#   #
#   #
```

Problem 2 - Prime Number Generator

It turns out cats are a lot smarter than we gave them credit for. They have learned to send simple encrypted messages to each other. These messages use a prime number as a key. Obviously, your cat doesn't want your dog to guess the key. This means your cat has to change the key at random times. However, being a cat, he's not very decisive about the number he wants. So, in exchange for not knocking your computer off your desk (he still gets to sit on your keyboard), he wants you to write a program that generates prime numbers. You will start off with 2, and generate the next prime number every time he presses the Enter key. Once he reaches a satisfactory prime number, he will hit '0', which is when you stop the program.

Specifications

- This program is worth 50 points, and is called `Primes.java`.
- Create a class with the appropriate name. All of the code should be in the main method. (5 points)
- You should generate the prime numbers in order. (25 points)
- After printing a prime number, wait for user input. If the user presses Enter, generate the next prime number. Print a tab character after every prime number. If the user input were '0', stop the program. (15 points)
- Please include comments wherever appropriate. (5 points)

Sample Runs

Regular text is what's printed by your program. Underlined text is user input, shown here as a sample. You will not be printing the underlined parts in your program.

Sample Run

```
2      ↵
3      ↵
5      ↵
7      ↵
11     ↵
13     ↵
17     ↵
19     ↵
23     ↵
29     0
```

Extra Credit Problem - Palindromic Primes

For this problem, you need to adapt your prime number program to check for palindromic primes. Palindromic primes are defined as prime numbers that are the same if read forwards or backwards. For example, 757 is a palindromic prime, but 59 is not. You need to print all the palindromic primes below a certain upper limit.

Specifications

- This program is worth 50 points, and is called `PalPrimes.java`. Turn this in with the other programs.
- Create a class with the appropriate name. All of the code should be in the main method. (5 points)
- Accept the upper limit from the user. (5 points)
- Generate a prime number. Check if it is a palindrome. If it is, print it. If not, move on to the next number. (35 points)
- Please include comments wherever appropriate. (5 points)

Sample Runs

Regular text is what's printed by your program. Underlined text is user input, shown here as a sample. You will not be printing the underlined parts in your program.

Sample Run

```
Please enter the upper limit: 250
The palindrome primes are:
2
3
5
7
11
101
131
151
181
191
```

Generic Guidelines

- Please add your name and FSUID as comments on the top of your program.
- Please make sure you're only using the concepts already discussed in class. These assignments are used to determine if you passed a certain learning milestone. So, please follow the specifications. Using concepts that are not in the specifications will result in a score of 0 points for that particular specification.
- Please make sure that you're conforming to output specifications (program name, expected inputs and outputs etc.). Your output must match the sample output exactly (especially the literal text on print statements).
- Please make sure your code is readable and well documented.
- Make sure to compile and run your program before you turn it in. Compilation errors can be costly.
- You can use an IDE for this assignment, but make sure your program compiles and runs on a terminal, since the program will be tested on a terminal.