

Homework Assignment #1

CS5004 – Object-Oriented Design
Northeastern University – Silicon Valley
Summer 2020

Due Sunday 05/17 at 11:00pm PDT

Instructions: Please submit on Canvas.

Problem 1 [6pts]. Determine the answer to the following expressions. You must provide a short explanation (a sentence or two) for each one.

- $2 \% 3$
- $0 \% 3$
- $3 \% 3$
- $-2 \% 3$
- $2 \% -3$
- $-2 \% -3$

Submission format: A text file `problem1.txt`.

Problem 2 [5pts]. We all know about bits and bytes. In particular we know that 1 byte equals $2^3 = 8$ bits. Now, you might have noticed that a hard disk drive which is advertised as having a capacity equal to 500 Gigabytes, shows up in your operating system with a smaller number, approximately 465. Why is that? It is because, in marketing, the SI¹ units are used where 1Kilo = $10^3 = 1000$. On the other hand, in computer science we use the IEC² standard where 1Kilo = $2^{10} = 1024$. To avoid confusion, when working with powers of 2, we are supposed to write KiB instead of KB (i.e. kibi instead of kilo) and so on.³ For example

$$1\text{MB} = 1000\text{KB} = 1000 \times 1000\text{B} = 10^6\text{B}$$

$$1\text{MiB} = 1024\text{KiB} = 1024 \times 1024\text{B} = 2^{20}\text{B}$$

In this problem, you write a simple program that converts giga to gibibytes. For example, given 500GB as input you must calculate its equivalence in GiB. Below is a skeleton for the code

¹System Internationale

²International Electrotechnical Commission

³Read https://en.wikipedia.org/wiki/binary_prefix

```

public class Converter {
    public static void main(String[] args) {
        long giga = 500;
        long gibi = 0;

        // your code for computing gibi from giga

        System.out.println(giga + "GB = " + gibi + "GiB");

    }
}

```

Submission format: A java source file `Converter.java`.

Problem 3 [4pts]. The following program will compile and run, but it uses a poor programming style. Modify the code so that it uses the coding conventions described in the class and mentioned in the book.

```

public class mess {
public static void main(String[] args)
    {
        double TIME; double PACE;
        System.out.println("This program calculates pace");
        TIME = 35.5; /* 35 minutes and 30 seconds */
        PACE = TIME / distance;
        System.out.println("Pace is " + PACE + " miles per hour.");
        double distance = 6.21;
    }
}

```

Refer to §1.4 (Program Style) in your book or consult the slides. **Submission format:** A Java source file with the correct name and extension.