CSE 2102: Introduction to Software Engineering
Built-in Types, Command Line Arguments
Assigned: January 26, 2023, Due: February 2, 2023

Problem A (20 pts.)

A.1: Write a program `AreafromCircumference.java` that accepts the circumference of a circle as input, and prints its area. Please note the following:

1. The program should be able to accept any positive real number as the circumference.
2. It should print the area upto two decimal places.
3. Use the value of π as 22/7.

Input cmd:

```
java AreafromCircumference 20
```

Output:

```
Area of circle is: 33.33
```

A.2: Can π be encoded as "static final" in the code? Why or why not? Justify your answer.

Problem B (20 pts.)

Write a program `VendingChange.java` that determines the change to be displayed from a vending machine. An item in the vending machine can cost between 25 cents and a dollar in 5-cent increments (25, 30, 35 …. , 90, 95 or 100), and the machine accepts only a single dollar bill to pay for the item. The machine then dispenses the change in as few coins as possible. The following interaction shows the output when the user buys an item for 45 cents. Assume that the input to the program is always correct, that is, it lies within the 25 and 100 (inclusive), and is also a multiple of 5.

Input cmd:

```
java VendingChange 45
```

Output:

```
You bought an item for 45 and gave me a dollar,
so your change is
2 quarters,
0 dimes, and
1 nickel.
```

Problem C (30 pts.)

Write a program `OperatorPrecedence.java` that accepts three floating point numbers x, y and z; and computes the cube root of $x^2 + y^2 - |z|$. The output should be printed to two decimal places.

Input cmd:

```
java OperatorPrecedence 5 5 8
```

Output:

```
Cube Root is 3.48
```

Problem D (30 pts.)

A physics student gets unexpected results when using the code:

```
F = G * m1 * m2 / r * r
```

to compute values according to the formula:

$F = Gm_1m_2/r^2$

D.1 Explain the problem.

D.2 Implement the correct formula in the program `Force.java`. accepts the two masses $m1$ and $m2$, and the distance between them r as input. The values of input should be provided in exponential notation, and the value of gravitational constant G is $6.674e\text{-}11$. The value of force should be printed up to two decimal places.

Input cmd:

```
java Force 1e+5 2e+5 1e+0
```

Output:

```
Force is 1.33
```

Submission & other instructions

The following deliverables must be submitted on HuskyCT by midnight on February 2, 2023:

1. .java and .class files for each problem. Code in .java files should be well-documented. Please make sure that you submit your code, and it compiles, we will test your code offline with specific test cases.
2. 2 test cases for each problem (.txt or .doc)
3. Answers to A.2, and D.1 in a separate document (.txt or .doc)

Late submissions (without any legitimate excuse) will incur a penalty of 10% per day.