KAZAKH KBTU BRITISH TECHNICAL UNIVERSITY

Object-Oriented programming

SIS #1

Deadline: 4th week. No late submissions will be accepted!

Problem #1

You need to write a `Temperature` class that has two fields: a temperature value (a double number) and a character for the scale, either 'C' for Celsius or 'F' for Fahrenheit. Make sure that these two fields can ONLY be accessed through the accessor methods outside of the class.

Constructors:
The class should have four constructors:

- one for each instance field (assume zero degree if no value is specified and Celsius if no scale is specified)
- one with two parameters for the two instance variables
- default constructor (set to zero degrees Celsius).

Methods:
The class should have 2 types of methods

(1) Two methods to return the temperature: one to return the degrees in Celsius, the other to return the degrees in Fahrenheit. Use the following formulas for conversion:

$$degreesC = 5(degreesF - 32) / 9$$
$$degreesF = (9(degreesC/5) + 32$$

(2) Three methods to set the fields: one to set the value, one to set the scale ('F' or 'C'), and one to set both.

(3) Method to return scale.

Problem # 2

Implement a class `Car` with the following properties. A class has a certain fuel efficiency, measured in km/liters and a certain amount of fuel in the gas tank. The efficiency is specified in the constructor, and the initial fuel level is 0.

- Supply a method `drive()` that simulates driving the car for a certain distance, reducing the amount of gasoline in the fuel tank.
- Also create a method `getGasInTank()`, returning the current amount of gasoline in the fuel tank, and `addGas()`, to add gasoline to the fuel tank.

Note: You can assume that the drive method is never called with a distance that consumes more than the available gas. Also create a `CarTester` class that tests all methods.

Problem #3

There is a very scary dragon living in Almaty city near KBTU. Everyday he needs to eat several young students for a launch. He usually kidnaps them one by one in the morning and eats at a launch time, having put them in a line at a cell in his prison. But sometimes he has problems with his launch, because students vanish! He still doesn't know that *pair of boy and a girl (B-G) can disappear if they stand together exactly in this order (B-G)* due to the magic of love. After that line becomes smaller. So, there is a possibility that no one will be left for a dragon launch!

You need to model a dragon launch. You need to have:

- Enumeration `Gender` that is used to distinguish boys / girls.
- Class `Person` containing an instance variable of type Gender, method `toString()` and any fields you want.
- Main class – `DragonLaunch`, with methods `kidnap(Person p), willDragonEatOrNot()`.

For example, for a line BBGG, there will be no launch, because firstly middle pair will vanish, after that two corner persons will become BG pair, and vanish in the same way. However, a line GBGB leaves 2 persons for a launch.

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