ITEC 4261 JAVA Programming

2024 Spring

Assignment #5

(Due date: Mar. 29, 23:59pm EST)

Important Notes:

1. Write a program of each question and **submit all source code files (.java files) of each question.** If you do not submit the source code files (.java files), you will have 0 points.
2. **Submit screen captures of each program outputs** using Microsoft Word document. Name the assignment as *Lastname.Firstname_Assgnment1* (e.g. Joobum.Kim_Assignment1.docx)

Problems:

1. Solve the following question below. (50 points)

Write a class named MonthDays. The class's constructor should accept two arguments:
- An integer for the month (1 = January, 2 February, etc.).
- An integer for the year

The class should have a method named numberOfDays that returns the number of days in the specified month. The method should use the following criteria to identify leap years:

1. Determine whether the year is divisible by 100. If it is, then it is a leap year if and if only it is divisible by 400. For example, 2000 is a leap year but 2100 is not.
2. If the year is not divisible by 100, then it is a leap year if and if only it is divisible by 4. For example, 2008 is a leap year but 2009 is not.

Demonstrate the class in a program that asks the user to enter the month (letting the user enter an integer in the range of 1 through 12) and the year. The program should then display the number of days in that month. Here is a sample run of the program:

```
Enter a month (1-12): 2 [Enter]
Enter a year: 2008 [Enter]
29 days
```

2. Solve the following question below. (50 points)

The following table lists the freezing and boiling points of several substances.

Substance	Freezing Point	Boiling Point
Ethyl Alcohol	−173	172
Oxygen	−362	−306
Water	32	212

Design a class that stores a temperature in a temperature field and has the appropriate accessor and mutator methods for the field. In addition to appropriate constructors, the class should have the following methods:

- **isEthylFreezing.** This method should return the boolean value true if the temperature stored in the temperature field is at or below the freezing point of ethyl alcohol. Otherwise, the method should return false.
- **isEthylBoiling.** This method should return the boolean value true if the temperature stored in the temperature field is at or above the boiling point of ethyl alcohol. Otherwise, the method should return false.
- **isOxygenFreezing.** This method should return the boolean value true if the temperature stored in the temperature field is at or below the freezing point of oxygen. Otherwise, the method should return false.
- **isOxygenBoiling.** This method should return the boolean value true if the temperature stored in the temperature field is at or above the boiling point of oxygen. Otherwise, the method should return false.
- **isWaterFreezing.** This method should return the boolean value true if the temperature stored in the temperature field is at or below the freezing point of water. Otherwise, the method should return false.
- **isWaterBoiling.** This method should return the boolean value true if the temperature stored in the temperature field is at or above the boiling point of water. Otherwise, the method should return false.

Write a program that demonstrates the class. The program should ask the user to enter a temperature, and then display a list of the substances that will freeze at that temperature and those that will boil at that temperature. For example, if the temperature is –20 the class should report that water will freeze and oxygen will boil at that temperature.