Northeastern University
CSYE 6200 – Concepts of Object-Oriented Design
Fall 2022, Prof. Jones Yu

Lab2

No submission is required

1. Problem 1

Write a program that calculates the energy needed to heat water from an initial temperature to a final temperature. Your program should prompt the user to enter the amount of water in kilograms and the initial and final temperatures of the water. The formula to compute the energy is:

$$Q = M * (finalTemperature - initialTemperature) * 4184$$

where **M** is the weight of water in kilograms, temperatures are in degrees Celsius, and energy **Q** is measured in joules.

Expected results:

```
Enter the amount of water in kilograms: 47.5
Enter the initial temperature: 2.5
Enter the final temperature: 13.5
The energy needed is 2186140.0
```

2. Problem 2

A shipping company uses the following function to calculate the cost (in dollars) of shipping based on the weight of the package (in pounds).

$$c(w) = \begin{cases} 3.5, \text{if } 0 < w <= 1 \\ 5.5, \text{if } 1 < w <= 3 \\ 8.5, \text{if } 3 < w <= 10 \\ 10.5, \text{if } 10 < w <= 20 \end{cases}$$

Write a program that prompts the user to enter the weight of the package and display the shipping cost. If the weight is greater than 20, display a message “the package cannot be shipped.”

Expected results:

```
Enter package weight: 3.6
The shipping cost is $8.5

Enter package weight: 0.4
The shipping cost is $3.5

Enter package weight: 30.3
The package cannot be shipped
```

3. Problem 3

Write a program that prompts the user to enter a year and the first three letters of a month name (with the first letter in uppercase) and displays the number of days in the month. The year, which should be positive, is needed to check for and handle leap years[1].

Expected results:

```
Enter a year: 2003
Enter a month: Jan
Jan 2003 has 31 days

Enter a year: 2017
Enter a month: Feb
Feb 2017 has 28 days
```

4. Problem 4

Write a program that prompts the user to enter a string and displays the number of the uppercase letters in the string.

Expected results:

```
Enter a string: Northeastern University
The number of uppercase letters is 2
```

[1] See https://en.wikipedia.org/wiki/Leap_year#Algorithm