Carnegie Mellon University in Qatar

Principles of Computing

15-110 - Fall 2018

Homework Assignment 6

1. Write a Python program to simulate the rolling of two dice. The program should roll the two dice and sum up their outcomes. Each die can show an integer value from 1 to 6, so the sum of the values will vary from 2 to 12, with 7 being the most frequent sum, and 2 and 12 the least frequent. The figure below shows the 36 possible combinations of the two dice. Your program should roll the dice 36,000,000 times. Use a one-dimensional array to tally the number of times each possible sum appears. Display the results in a tabular format.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

2. Create a class called `Date` that includes three instance variables - a month (type `int`), a day (type `int`) and a year (type `int`). Provide a constructor that initializes the three instance variables and assumes that the values provided are correct. Provide a set and a get method for each instance variable. Provide a method `displayDate` that displays the month, day and year separated by forward slashes (/). Test your `Date` class by creating multiple objects out of it and calling all its methods through these objects. Submit all your code in a Python module named `Date.py`.

3. While exercising, you can use a heart-rate monitor to see that your heart rate stays within a safe range suggested by your trainers and doctors. According to the American Heart Association (AHA), the formula for calculating your *maximum heart rate* in beats per minute is 220 minus your age in years. Your *target heart rate* is a range that is 50-85% of your maximum heart rate. [*Note*: These formulas are estimates provided by the AHA. Maximum and target heart rates may vary based on the health, fitness and gender of the individual. Always consult a physician or qualified health care professional before beginning or modifying an exercise program.]

Create a class called `HeartRates`. The class attributes should include the person's first name (type `string`), last name (type `string`) and date of birth (type `Date`, which is the class that you created above in Question 2). Your `HeartRates` class should have a constructor that receives this data as parameters. For each attribute provide set and get methods. The class should also include a method that calculates and returns the person's age (in years), a method that calculates and returns the person's maximum heart rate and a method that calculates and returns the person's target heart rate.

Test your class by creating multiple objects out of it and calling all its methods through these objects. Submit all your code in a Python module named `HeartRates.py`.

15pts 4. Write a program that allows the user to draw a simple house using five mouse-clicks. The first two clicks will be the opposite corners of the rectangular frame of the house (see the figure below). The third click will indicate the center of the top edge of a rectangular door. The door should have a total width that is $\frac{1}{5}$ of the width of the house frame. The sides of the door should extend from the corners of the top down to the bottom of the frame. The fourth click will indicate the *center* of a square window. The window is half as wide as the door. The last click will indicate the peak of the roof. The edges of the roof will extend from the point at the peak to the corners of the top edge of the house frame.