COMSATS University, Islamabad

Assignment 2

Deadline: 29/10/2021

All questions are mapped to CLO-2

Q1. Assume a runner runs 14 kilometers in 45 minutes and 30 seconds. Draw a flowchart that displays the average speed in miles per hour. (Note that 1 mile is 1.6 kilometers.)

Q2. Draw a flowchart that converts pounds into kilograms. The program prompts the user to enter a value in pounds, converts it to kilograms, and displays the result. One pound is 0.454 kilograms. Here is a sample run:

```
Enter a value in pounds: 55.5
55.5 pounds is 25.197 kilograms
```

Q3. Draw a flowchart 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

$$Q = M * (\text{finalTemperature} - \text{initialTemperature}) * 4184$$

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

```
Enter the amount of water in kilograms: 55.5
Enter the initial temperature: 3.5
Enter the final temperature: 10.5
The energy needed is 1625484.0
```

Q4. Draw a flowchart that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 932, the sum of all its digits is 14.
(Hint: Use the % operator to extract digits, and use the // operator to remove the extracted digit. For instance, 932 % 10 = 2 and 932 // 10 = 93.)
Here is a sample run:

```
Enter a number between 0 and 1000: 999
The sum of the digits is 27
```

Q5. Given an airplane's acceleration **a** and take-off speed **v**, you can compute the minimum runway length needed for an airplane to take off using the following formula:

$$length = \frac{v^2}{2a}$$

Draw a flowchart that prompts the user to enter **v** in meters/second (m/s) and the acceleration a in meters/second squared (m/s^2) and displays the minimum runway length. Here is a sample run:

```
Enter speed and acceleration: 60, 3.5 Enter
The minimum runway length for this airplane is 514.286 meters
```

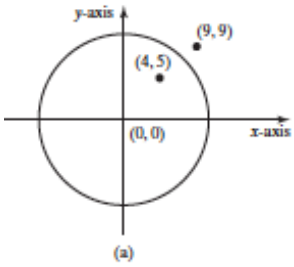
Q6. Draw a flowchart that prompts the user to enter three integers and displays them in increasing order.

Q7. (Compute the perimeter of a triangle) Draw a flowchart that reads three edges for a triangle and computes the perimeter if the input is valid. Otherwise, display that the input is invalid. The input is valid if the sum of every pair of two edges is greater than the remaining edge. Here is a sample run:

```
Enter three edges: 1, 1, 1 Enter
The perimeter is 3
```

```
Enter three edges: 1, 3, 1 Enter
The input is invalid
```

Q8. Draw a flowchart that prompts the user to enter a point (x, y) and checks whether the point is within the circle centered at (0, 0) with radius 10. For example, (4, 5) is inside the circle and (9, 9) is outside the circle, as shown in the given Figure.



(a)

(Hint: A point is in the circle if its distance to (0, 0) is less than or equal to 10. The formula for computing the distance is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Test your program to cover all cases.) Two sample runs are shown next.

```
Enter a point with two coordinates: 4, 5 Enter
Point (4.0, 5.0) is in the circle
```

```
Enter a point with two coordinates: 9, 9 Enter
Point (9.0, 9.0) is not in the circle
```

Q9. Draw a flowchart that prompts the user to enter a three-digit integer and determines whether it is a palindrome number. A number is a palindrome if it reads the same from right to left and from left to right. Here is a sample run of this program:

```
Enter a three-digit integer: 121
121 is a palindrome
```

```
Enter a three-digit integer: 123
123 is not a palindrome
```

Q10. Draw a flowchart which accepts a 4 digit binary numbers as its input and check if the number is even or not.