Lab 1 (Arithmetic operations)

Note: For each question, identify the steps that solve the problem before embarking to write the program. Categorise the steps into the IPO structure.

1. The formula to convert temperature in fahrenheit to centigrade is as follows:

   $$c = \frac{5}{9}(f - 32)$$

   Write a program that reads an input in fahrenheit and displays the temperature in centigrade.

2. Write a program that reads 3 numbers and displays the sum and average of these 3 numbers.

3. Write a program that takes in a 3 digit integer and displays the sum and product of the digits. E.g. if the number is 123, the sum displayed is 6 and the product is also 6.

4. Write a program that reads in a positive integer representing time in seconds and converts it to hour, minute and seconds. For example, if the input is 3670 seconds, output 1 hour, 1 minute and 10 seconds.

5. Write a program that reads an input representing a change which is an amount less than 1 dollar. The program calculates the change into 50, 10, 5 and 1 cent coins. The program then displays the number of each coin required for that change. E.g.

   Enter change: **47**
   50 cent: 0
   10 cent: 4
   5 cent: 1
   1 cent: 2

6. A restaurant is offering meals at 50% discount. A service charge (10%) and GST (7%) apply to the discounted cost. While the service charge applies to the discounted price, note that the GST calculation is based on the total of the discounted amount and the service charge.

   Write a program that reads in the cost of the meal and displays a detailed receipt. An example is as follows:

```
Enter meal amount ($): 120

Receipt
Cost of meal:     $120.00
50% discount:     $ 60.00
Service charge:   $  6.00
GST:              $  4.62
Total amount:     $ 70.62
```

   (Output should be formatted.)

7. The area of a triangle with sides a, b, c can be determined using Heron's formula:

$$S = \sqrt{s(s-a)(s-b)(s-c)}$$

where s = ½ (a + b + c) is the semi-perimeter, or half of the triangle's perimeter.

Write a program that reads the lengths of the sides of a triangle and displays the area. Assume that input is valid, i.e. the sides are able to form a triangle. Import the Math library to use the square root function.

8. The formula to compute compound interest C for a loan L at the end of n years at i % interest per annum is as follows:

$$C = L\left(1 + \frac{i}{100}\right)^n$$

Write a program that has 3 inputs – loan amount, duration in years and interest rate. The program displays the compound interest based on the formula above.

9. Write a program that reads in a time in 24 hr format. The program displays the time after adding 1 second to the time.
First example:

```
Enter current hr: 2
Enter current min: 58
Enter current sec: 50
Clock time is 02:58:59
After 1 second, the time is 02:59:00
```

Second example:

```
Enter current hr: 23
Enter current min: 59
Enter current sec: 59
Clock time is 23:59:59
After 1 second, the time is 00:00:00
```

Note: hr is between 0 to 23, min 0 to 59, sec 0 to 59.
No if statements to be used for this question.