Introduction

1. Instructions

- You are to solve the following programs in the lab using the problem-solving and algorithm methods and share the answer with your lecturer.
- Remember the following rules:
    - Think before you program!
    - A program is a human-readable essay on problem-solving that also happens to execute on a computer.
    - The best way to improve your programming and problem-solving skills is to practice!
    - Test your code, often and thoroughly!
    - If it was hard to write, it is probably hard to read.

2. Notes

2A. Three Steps That A Program Typically Performs:

- Gather input data:
    - from keyboard
    - from files on disk drives
- Process the input data
- Display the results as output:
    - send it to the screen
    - and write to a file

2B. The Moment You Read The Problem; You Should Try To Answer The Following Questions:

- **Output**:
    - What information should the solution provide?

- **Input**:
    - What data do I have to work with?

- **Process**:
    - How to work with the data to deliver the needed solution?

Revision - Input Function

- The input function is a built-in function in Python that allows developers to read data from the user.
- The input function in Python reads the input as a string, which can then be converted into other data types, such as integers, floating point numbers, or Booleans

Python Code	Result
name = input("Please Enter Your Name: ") id= input("Please Enter Your Employee ID: ") print("Name & Id: ", name, id)	Please Enter Your Name: Delion Please Enter Your Employee ID: 1001850625 Name & Id: Delion 1001850625

1. Example

- To input two float numbers and find their sum and average.

Python Code	Result

# python code to read two float numbers 	
# and find their addition, average 	
 	
num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))
 	
# addition 	
add = num1 + num2
 	
# average 	
avg = add/2
 	
print("addition: ", add)
print("average: ", avg)
	Enter first number: 123.456
	Enter second number: 789.02
	addition: 912.476
	average: 456.238

Revision - round() Function

1. Definition and Usage

- The round() function returns a floating point number, a rounded version of the specified number, with the specified number of decimals.
- The default number of decimals is 0, meaning that the function will return the nearest integer.

2. Syntax

- **round(number, digits)**
  - **number**: **Required**. The number to be rounded
  - **digits**: **Optional**. The number of decimals to use when rounding the number. Default is 0

3. Example 1

- Round a number to only two decimals:
  - x = round(5.76543, 2)
  - print(x)

Answer: **5.77**

4. Example 2

- Round to the nearest integer:
  - x = round(5.76543)
  - print(x)

Answer: **6**

Revision - if…else Statement

1. Note

- The **if…else** statement is used to execute a block of code among two alternatives.
- However, if we need to make a choice between more than two alternatives, we use the **if…elif…else** statement.

if…else	if…elif…else

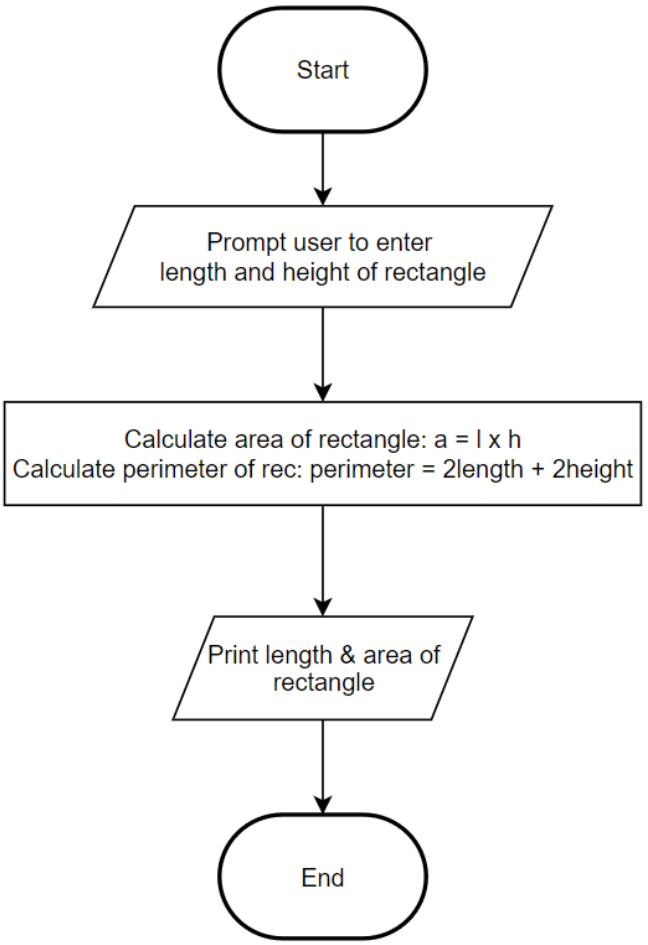
num = 10
 	
if num > 0:
  print("Positive number")
else:
  print("Negative number")
 	
print("This statement always execute")
	num = 0
	
	if num > 0:
	  print("Positive number")
	elif num < 0:
	  print("Negative number")
	else:
	  print("Zero")
	
	print("This statement always execute")

Questions

1. Write a program that prompts the user to enter the length and height of a rectangle and prints the area and perimeter of the rectangle.

Answer:

```
length = float(input("Enter the length of the rectangle: "))
height = float(input("Enter the height of the rectangle: "))


area = length * height
perimeter = (2 * length) + (2 * height)


print("The area of the rectangle is:", area)
print("The perimeter of the rectangle is:", perimeter)
```

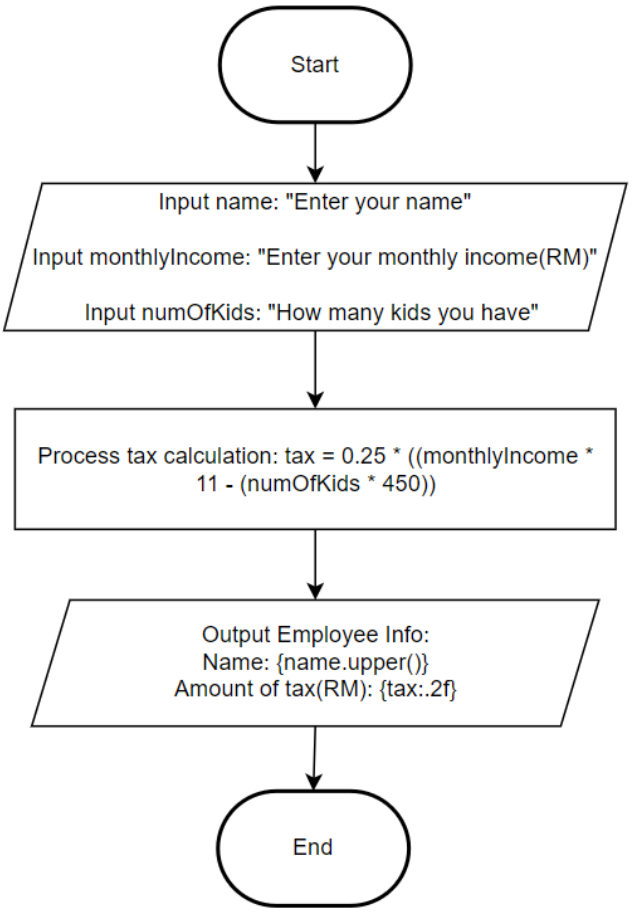


2. Calculate employee income tax based on the following formula:

- Tax = 0.25 * [(monthly income * 11) – (number of kids * 450)]
- Your program will display the name of the employee and the amount of tax on the screen.

Answer:

```
# input
name = input("Enter your name:")
monthlyIncome = float(input("Enter your monthly income(RM):"))
numOfKids = int(input("How many kids you have:"))

# process
tax = 0.25 * ((monthlyIncome * 11) - (numOfKids * 450))

# output
print("Employee Info")
print("-------------")
print(f"Name:{name.upper()}")
print(f"Amount of tax(RM):{tax:.2f}")
```



Start: The process begins.

Input name: The user is prompted to input their name.
Input monthlyIncome: The user is prompted to input their monthly income.
Input numOfKids: The user is prompted to input the number of kids they have.

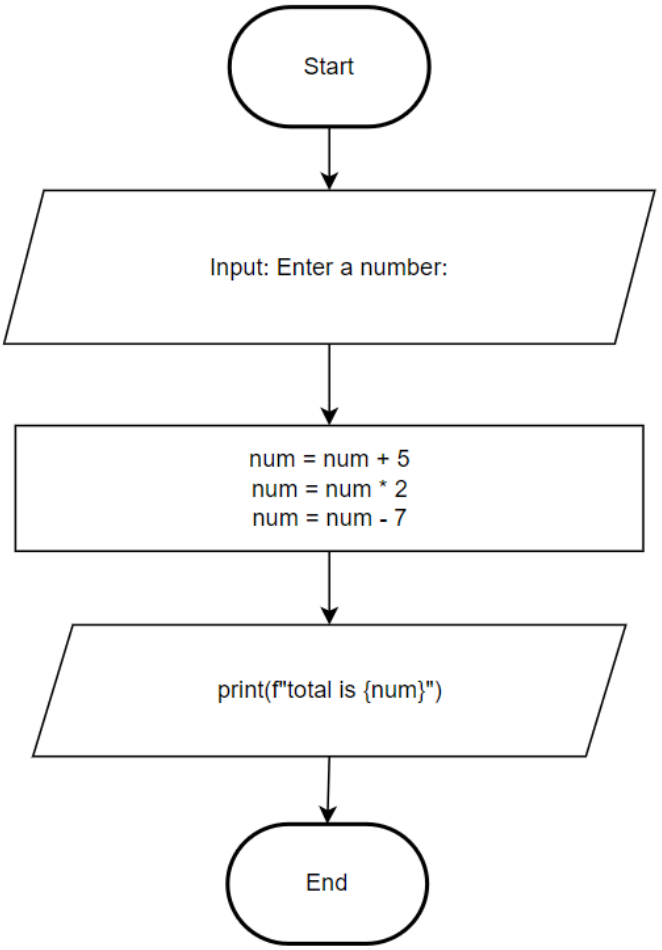
Process tax calculation: The tax is calculated based on the provided formula.

Output Employee Info: The system outputs the employee's name (in uppercase) and the calculated tax amount in RM.

3. Receive an integer from the user, add 5 to it, double it, subtract 7 from it, and display the final number on the screen.

Answer:

```
#input
num = int(input("Enter a number:"))

#process
num = num + 5
num = num * 2
num = num - 7

#output
print(f"total is {num}")
```



 # Shortcut Way

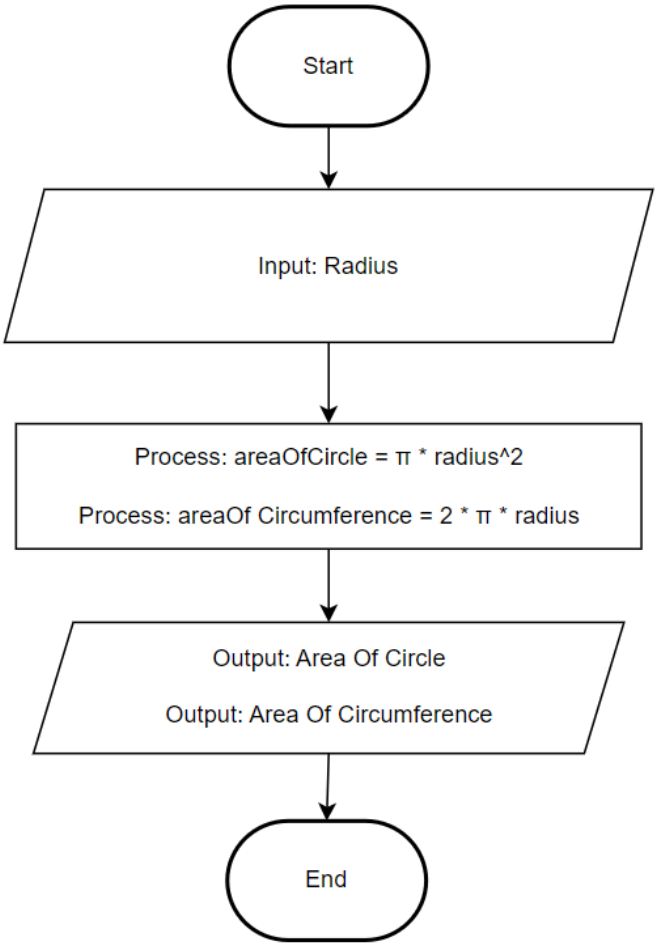
```
#input
num = int(input("Enter a number:"))

#process
num += 5
num *= 2
num -= - 7

#output
print(f"total is {num}")
```

4. Calculate the area and circumference of the circle.

Answer:

 # Mathematical Functions / Library / Module

```
import math
radius = float(input("Enter the value of
radius(cm):"))

#process
areaOfCircle = math.pi * math.pow(radius,2)
areaOfCircumference = 2 * math.pi * radius

#output
print(f"Area Of Circle:{areaOfCircle:.2f}")
print(f"Area Of
Circumference:{areaOfCircumference:.2f}")
```



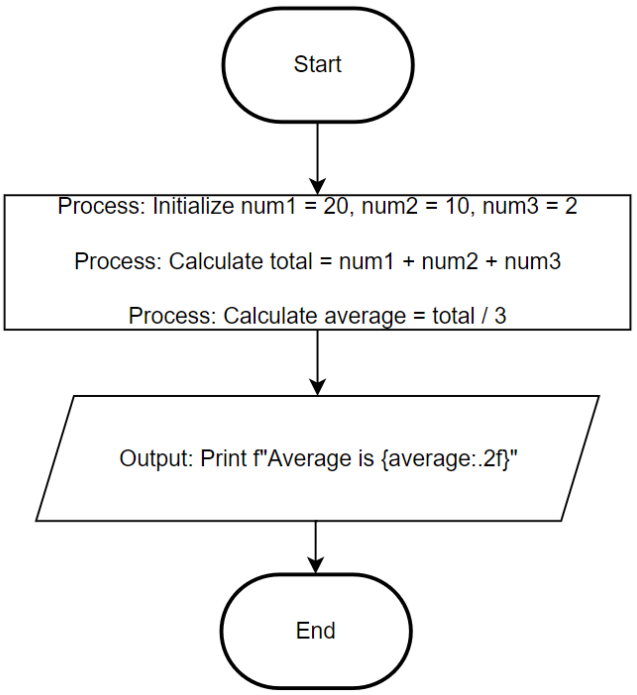
 # Another way

```
# Area of circle = pi r square
# circumference of circle = 2 pi r

pi = 3.142

# Input
radius = float(input("Enter the value of
radius(cm):"))

#process
areaOfCircle = pi * radius * radius
areaOfCircumference = 2 * pi * radius

#output
print(f"Area Of Circle: ",areaOfCircle)
print(f"Area Of Circumference:
",areaOfCircumference)
```

5. Calculate and print the average of three numbers: 20, 10, and 2.

Answer:

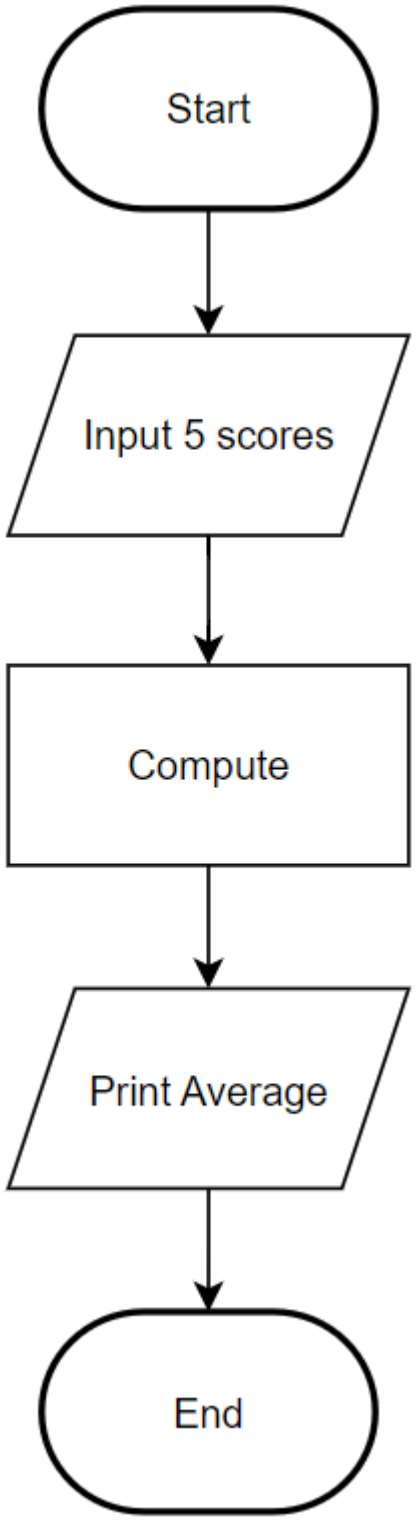
```
# num 123 is variable; 20,10,2 is value
# num 1=20, num 2=10, num3 = 2
num1, num2, num3 = 20, 10, 2

total = num1 +num2 +num3
average = total/3

print(f"Average is {average:.2f}")
```



6. Write a program that prompts the user to enter five test scores and then prints the average of the test scores.

Answer:

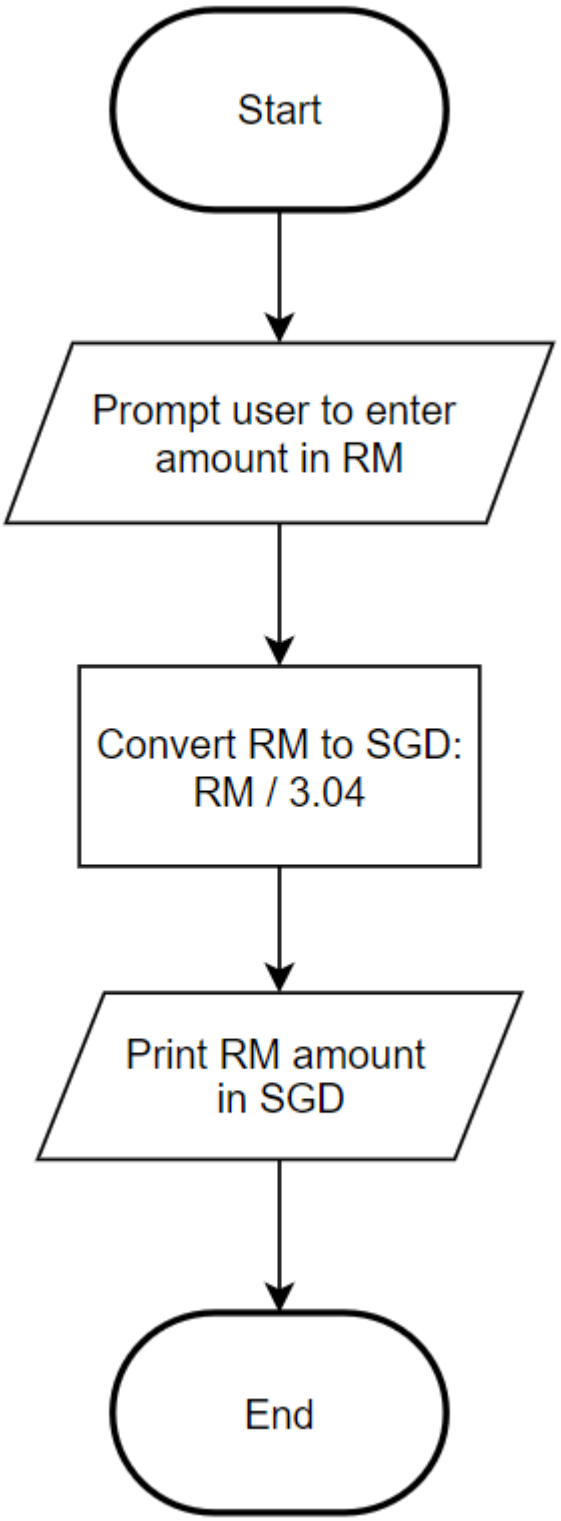
```
userInput1 = float(input("Enter score 1: "))
userInput2 = float(input("Enter score 1: "))
userInput3 = float(input("Enter score 1: "))
userInput4 = float(input("Enter score 1: "))
userInput5 = float(input("Enter score 1: "))


score_total = (userInput1 + userInput2 +
userInput3 + userInput4 + userInput5) / 5


print("Average score: ", round(score_total, 2))
```



7. Write a program that converts from RM to SGD (Singapore Dollar). On 1st May 2020, where 1 SGD is RM 3.04. Prompt the user to enter an RM amount and print the amount in SGD.

Answer:

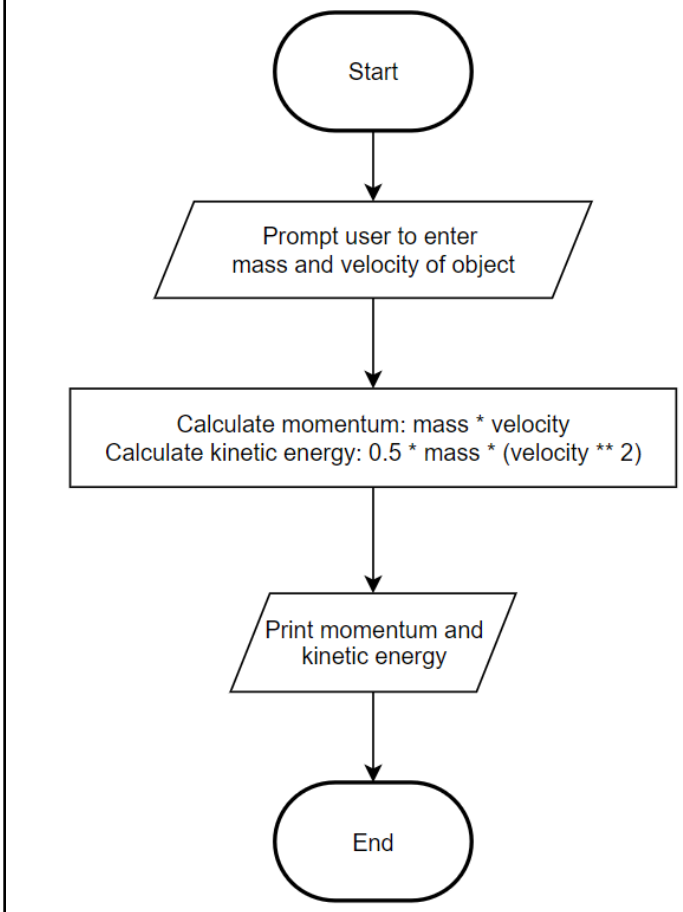
```
rm_amount = float(input("Enter RM value: RM "))

exchange_rate = 3.04


sgd_amount = round((rm_amount / exchange_rate),3)


print("The amount in SGD is: SGD", sgd_amount)
```



8. Write a program that accepts an object's mass (in kilograms) and velocity (in meters per second) as inputs and then outputs its momentum and kinetic energy given the following information.

Answer:

```
mass = float(input("Enter the mass of the object (in kilograms): "))
velocity = float(input("Enter the velocity of the object (in meters per second): "))


momentum = mass * velocity
kinetic_energy = 0.5 * mass * (velocity ** 2)


print("The momentum of the object is: ",momentum )
print("The kinetic energy of the object is: ",kinetic_energy)
```

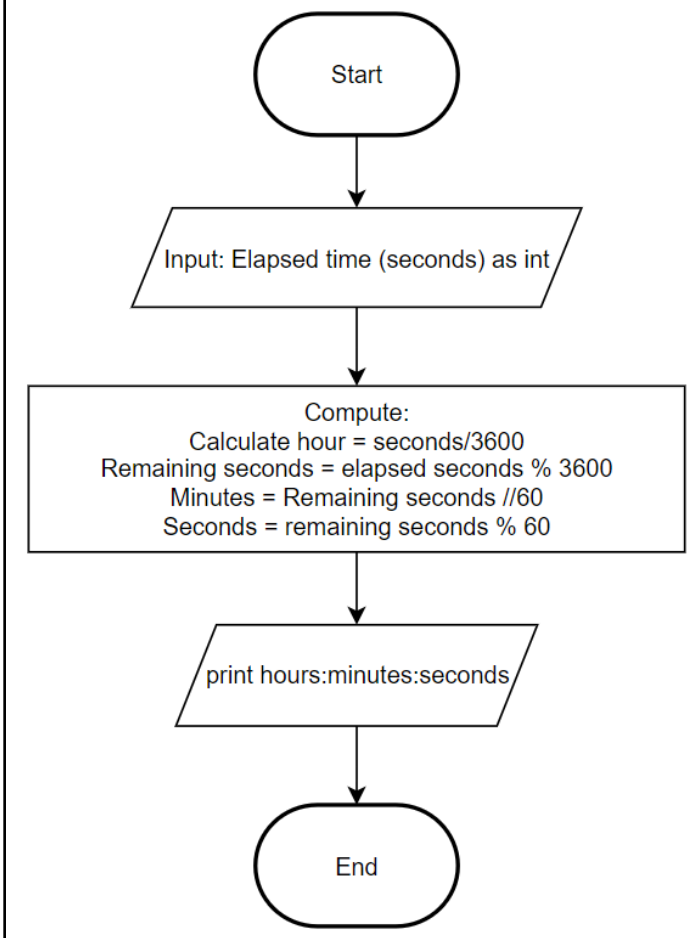


9. Write a program that prompts the user to input the elapsed time for an event in seconds. The program then outputs the elapsed time in hours, minutes, and seconds. For example, if the elapsed time is 9630 seconds, then the output would be 2:40:30.

Answer:

- **Input**: Enter elapsed time in seconds
- **Processing**: Calculate hours, minutes, and seconds (1hr = 60 mins = 60*60 seconds = 3600 seconds)
- **Output**: Display elapsed time as (hours:minutes:seconds)

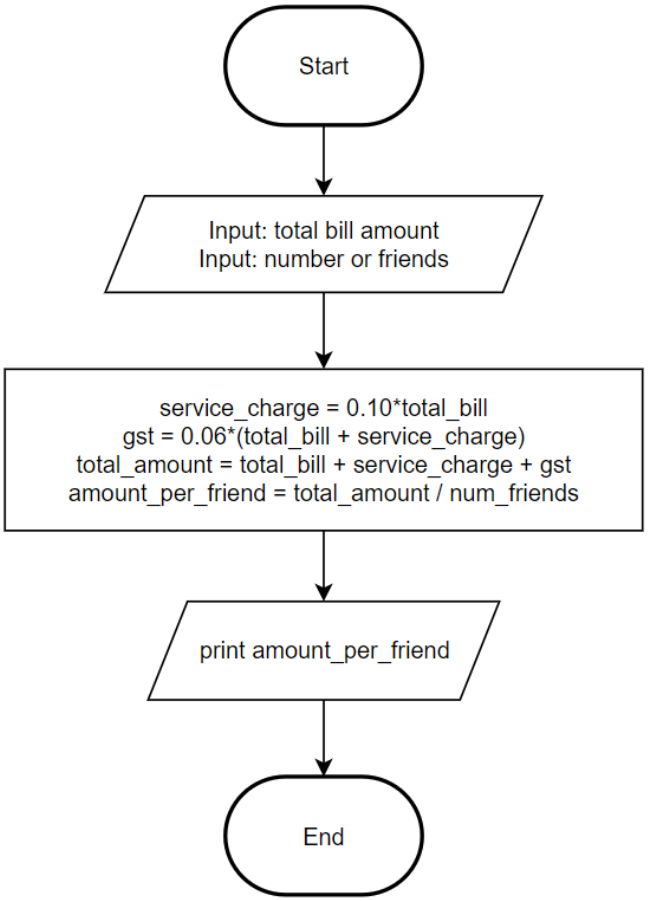
```
# Prompt the user to input the elapsed time in seconds
elapsed_time_seconds = int(input("Enter the elapsed time in seconds: "))


# Calculate hours, minutes, and seconds
hours = elapsed_time_seconds // 3600
remaining_seconds = elapsed_time_seconds % 3600
minutes = remaining_seconds // 60
seconds = remaining_seconds % 60


# Print the elapsed time in hours, minutes, and seconds
print(f"The elapsed time is: {hours}:{minutes:02d}:{seconds:02d}")
```



10. Write a program that splits a restaurant bill among a group of friends. The program prompts the user to input the total of the bill and the number of friends splitting the bill. The program first calculates and adds a 10% service charge to the total, and then calculates and adds a 6% GST to the total (including the service charge). The program then outputs the amount to be paid by each friend.

Answer:

```
# Prompt the user to input the total bill and the number of freinds
total_bill = float(input("Enter the total bill amount: "))
num_friends = int(input("Enter the number of friends splitting the bill: "))


# Calculate service charge (10% of the total bill)
service_charge = total_bill * 0.10


# Calculate GST (6% of the total bill including the service charge)
gst = 0.06 * (total_bill + service_charge)


# Calculate the total amount to be paid
total_amount = total_bill + service_charge + gst


# Calculate the amount to be paid by each friend
amount_per_friend = total_amount / num_friends


# Print the result
print(f"Each friend should pay: ${amount_per_friend:.2f}")
```



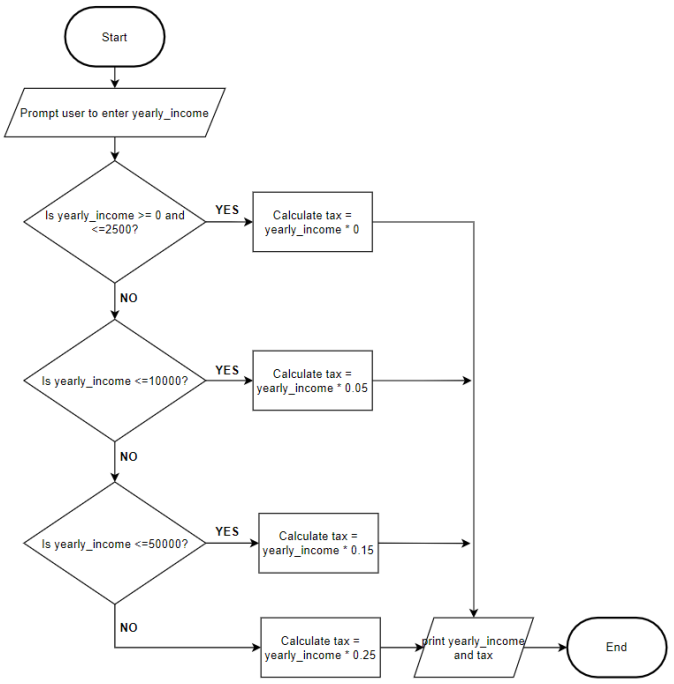
11. Write a program that prompts the user for his/her yearly income, and outputs the amount of taxes to pay based on the yearly income. The tax table is as follows:

- RM 0 to 2,500 –Tax rate: 0%
- RM 2,501 to 10,000 –Tax rate: 5%
- RM 10,001 to 50,000 –Tax rate: 15%
- Exceeding 50,001 –Tax rate: 25%

For example, if the income is RM 12,000, the total taxes would be RM 1,800 (15%).

Answer:

```
yearly_income = float(input('Enter yearly income in RM: '))

if yearly_income >= 0.0 and yearly_income <= 2500.0:
   total_taxes = 0.0
elif yearly_income <= 10000.0:
   total_taxes = yearly_income * (5 / 100)
elif yearly_income <= 50000.0:
   total_taxes = yearly_income * (15 / 100)
else:
   total_taxes = yearly_income * (25 / 100)

print('The total taxes for yearly income RM' + str(yearly_income) + ' is RM' + str(total_taxes))
```



12. Company ABC is introducing a new data plan for smartphones. Each GB (Gigabyte) of data will cost RM 15, up to 10 GB. Any data over 10 GB will be charged at RM 30 per GB.

Write a program that prompts the user to enter their monthly data usage (in GB) and prints the data charges for the month.

- Two Conditions – If else
  - If you are using equal or less than 10GB, you will be charged for RM 15 for each GB
  - If more than 10 GB, any data after 10GB will be charged RM 30 for each.

Answer:

```
data_usage = float(input('Enter data usage in GB: '))

if data_usage <= 10:
   data_charges = data_usage * 15
else:
   data_charges_10GB = 10 * 15
   data_charges_extra = (data_usage - 10) * 30
   data_charges = data_charges_10GB + data_charges_extra

print('The monthly data charges for ' + str(data_usage) + 'GB is RM' + str(data_charges))
```