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WIX1002 Fundamentals of Programming
Tutorial 1 Problem Solving in Programming

Draw the Input Process Output (IPO) model and build the pseudocode, flow chart for each of the problems:

Part I

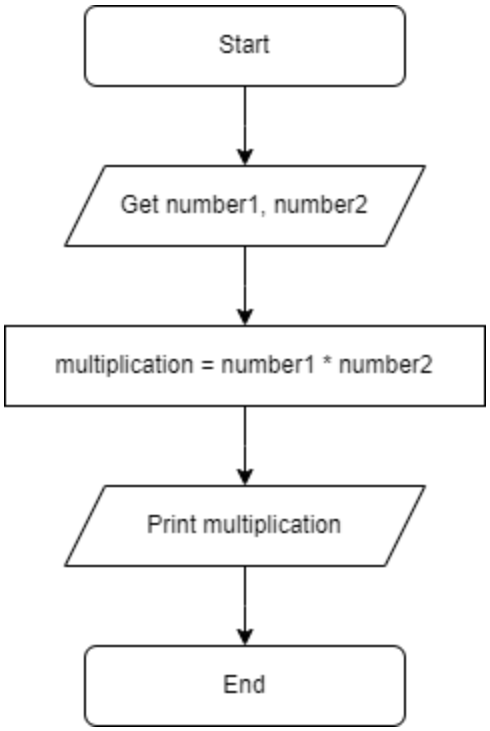
1. Request two numbers from the user and print the multiplication of the numbers.

INPUT	PROCESS	OUTPUT
• number1 • number2	multiplication = number1 * number2	• multiplication

Pseudocode ### Start, End and Numbering is not necessary

Get number1, number2
Calculate multiplication based on number1 and number2
Print the multiplication of the two numbers

Flow Chart



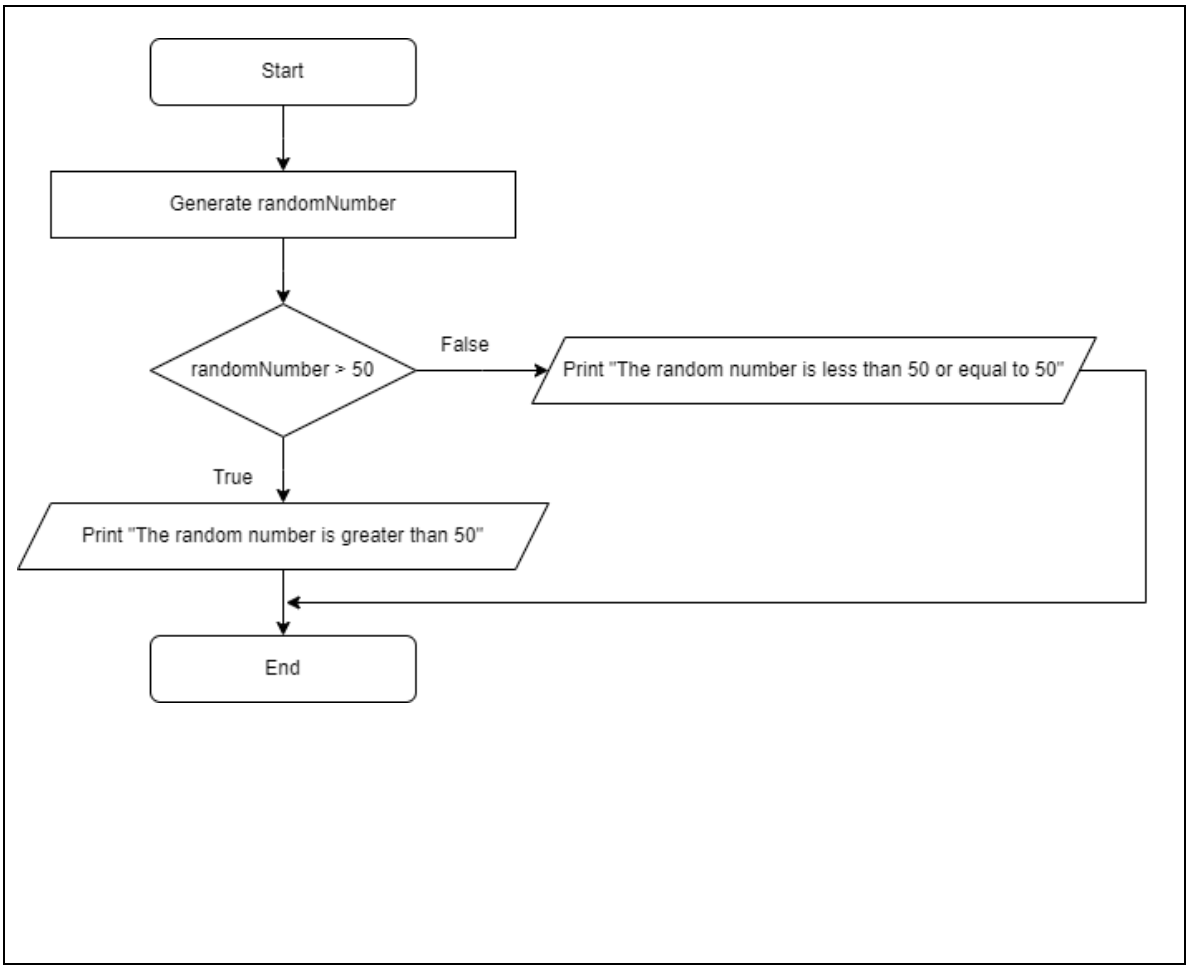
2. Determine whether a random number is greater than 50.

INPUT	PROCESS	OUTPUT
-	Determine whether the number is greater than 50, is less than 50 or equal to 50	• True: "The random number is greater than 50" • False: "The random number is less than 50"

Pseudocode

```
Generate a random number
if the mark is more than 50
  Print "The random number is greater than 50"
otherwise
  Print "The random number is less than 50 or equal to 50"
```

Flow Chart



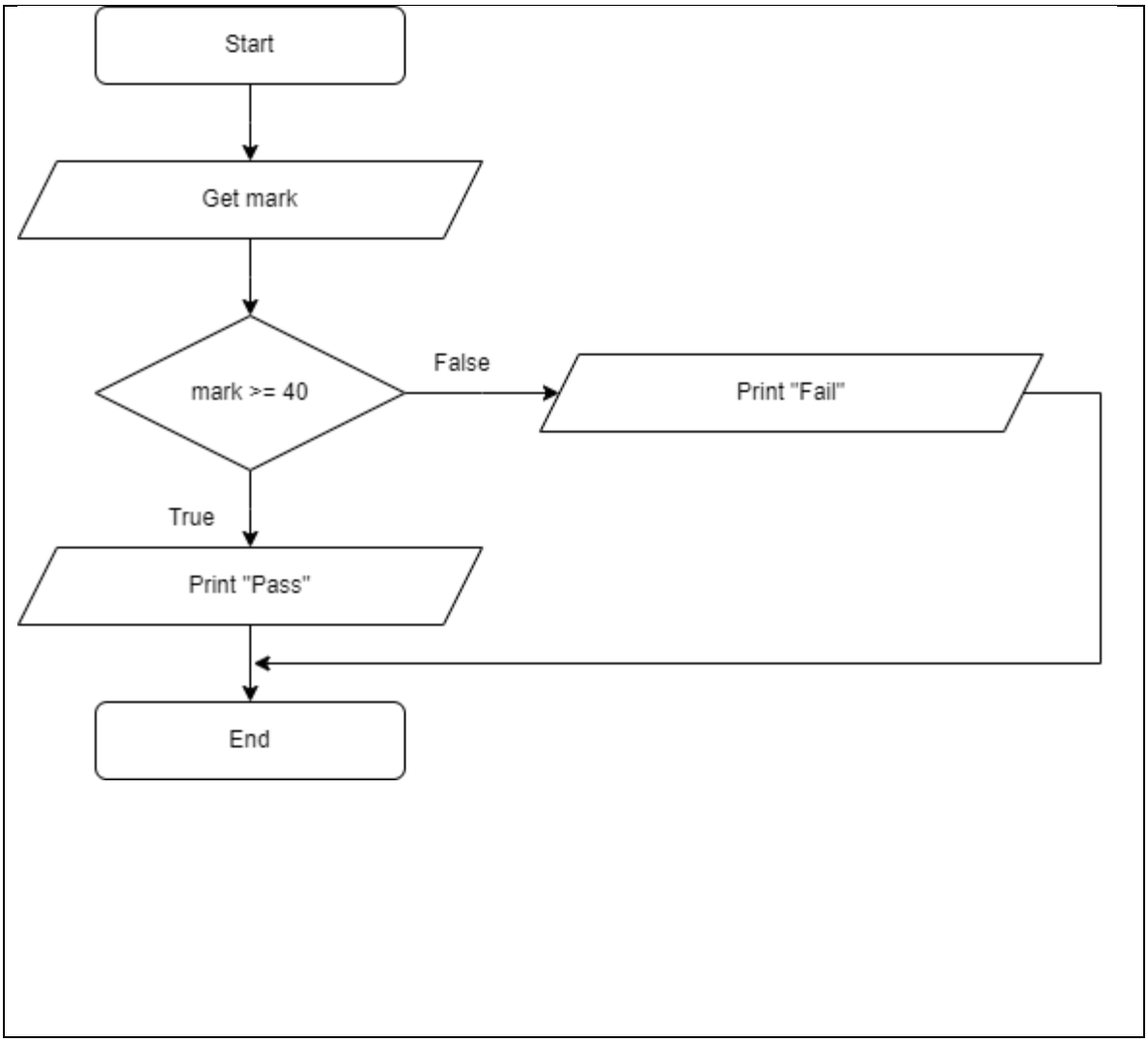
3. Print the pass/fail grade based on the mark entered by user. The passing mark is at least 40.

INPUT	PROCESS	OUTPUT
• mark	Determine whether the mark is greater than 40 or equal to 40, less than 40	• Pass grade • Fail grade

Pseudocode

```
Get mark
if the mark is more than or equal to 40
  Print “Pass”
otherwise
  Print “Fail”
```

Flow Chart



4. Print the results of the two players' dice game.

INPUT	PROCESS	OUTPUT
• dice1 • dice2 (1-6 only)	Compare the values of dice1 and dice2	• Dice1 is greater than Dice2 • Dice2 is greater than Dice1 • Draw

Pseudocode

```
Get dice1 from player1 (1-6 only)
Get dice2 from player2 (1-6 only)
if dice1 is greater than dice2 score
  Print "Player1 win!"
otherwise if dice2 is greater than dice1
  Print "Player2 win!"
otherwise
  Print "Draw"
```

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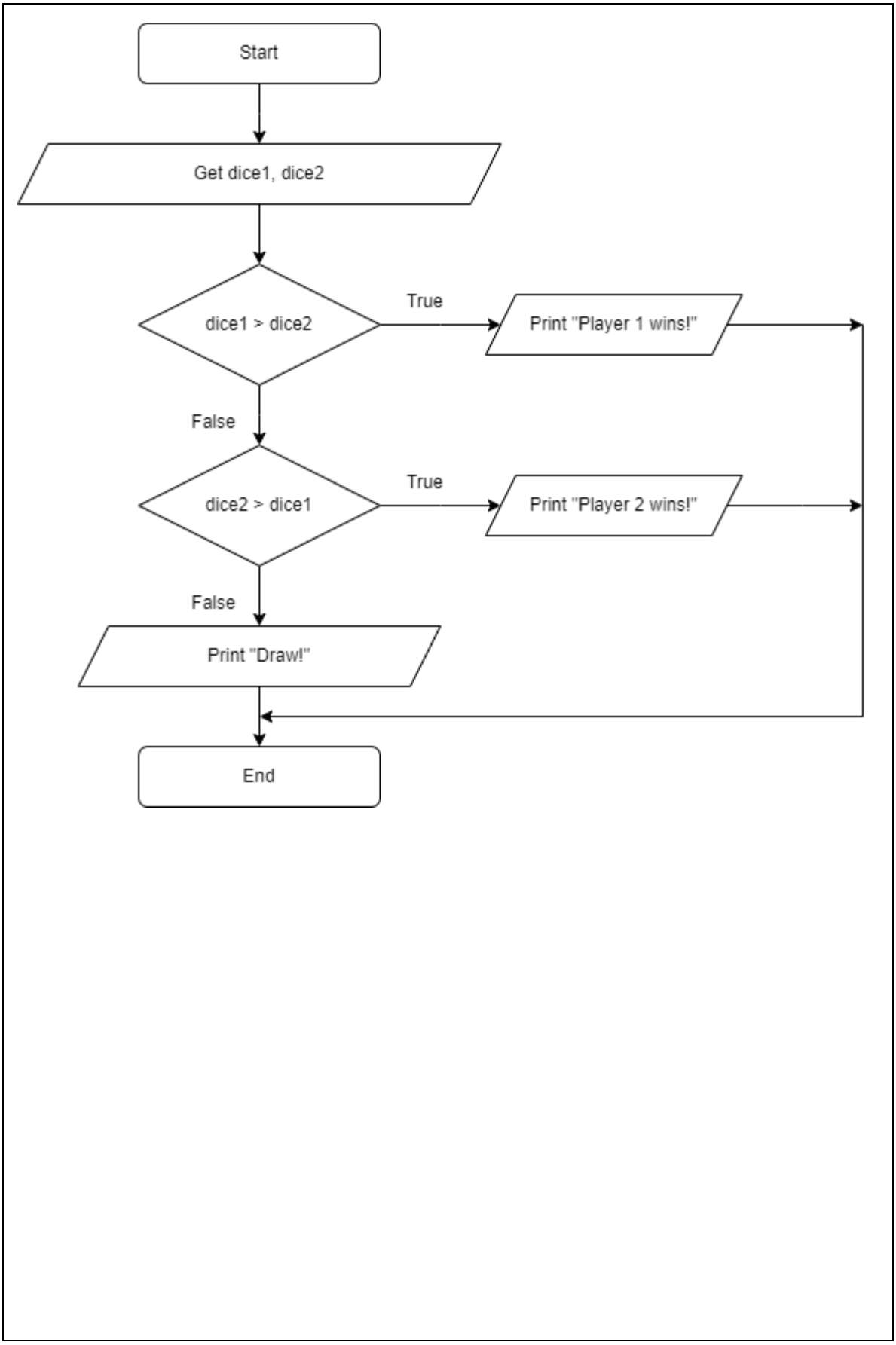
Flow Chart



5. Print the perimeter of a rectangle. # 4 sides, 2 sides=X, 2 sides = Y

INPUT	PROCESS	OUTPUT
• length • width	perimeter = (2*length) + (2*width)	• perimeter

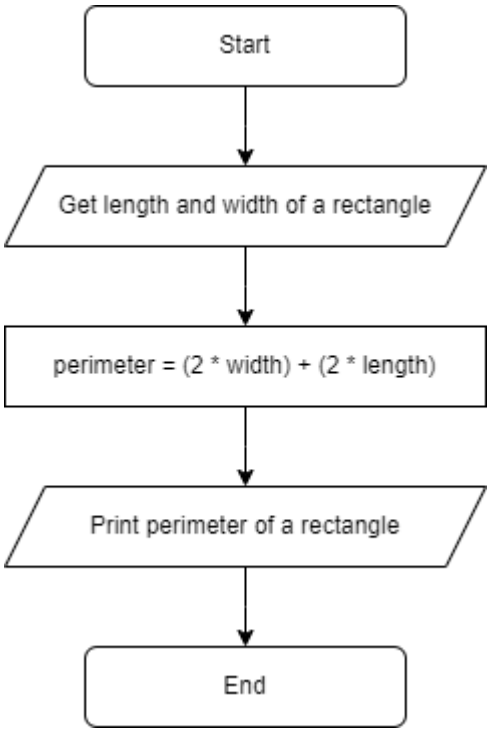
Pseudocode

Get length and width of a rectangle

Calculate perimeter of a rectangle = (2 multiply length) + (2 multiply width)

Print the perimeter of a rectangle

Flow Chart



6. Print the minimum number from 10 random numbers generated by computer.

INPUT	PROCESS	OUTPUT
-	Check the minimum random number	Minimum number

Pseudocode

```
Set a minimum number as 1000000
Set a counter as 0
While the counter is less than 10
  Generate a random number
  if the random number is less than the minimum number
     Assign the random number as the minimum number
  Increase counter by 1
Print the minimum number
```

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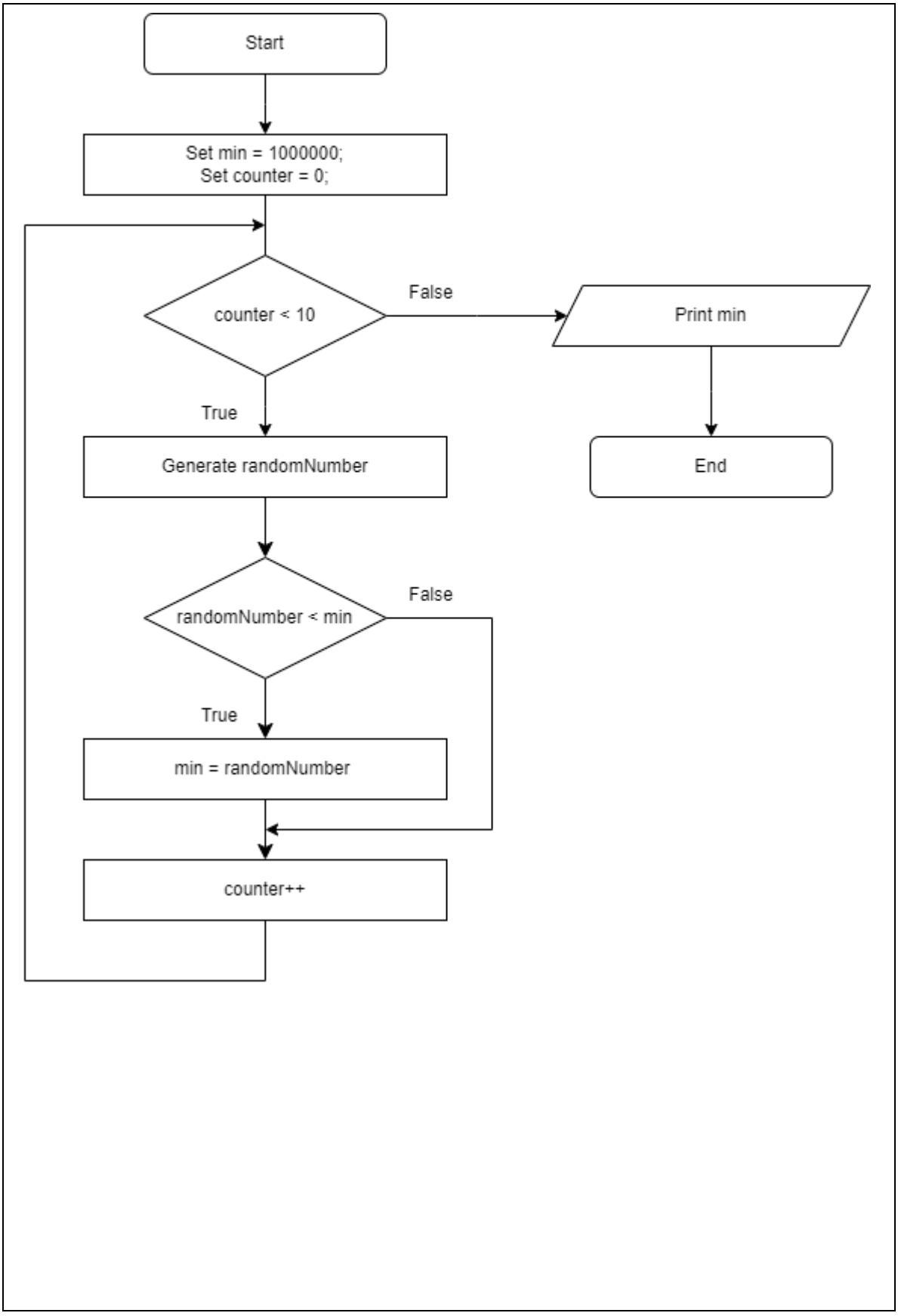
Flow Chart



7. Print the number of odd and even number from 10 random numbers generated by computer. The random number must be from 10 – 100.

INPUT	PROCESS	OUTPUT
-	Calculate the number of odd and even numbers	• The number of odd and even number

Pseudocode

```
Set oddNumber as 0 and evenNumber as 0
Set a counter as 0
While the counter is less than 10
  Generate a random number with 10 - 100
  if the random number modulus 2 equal to zero
    increase the evenNumber by 1
  otherwise
    increase the oddNumber by 1
Increase counter by 1
Print the number of odd and even number
```

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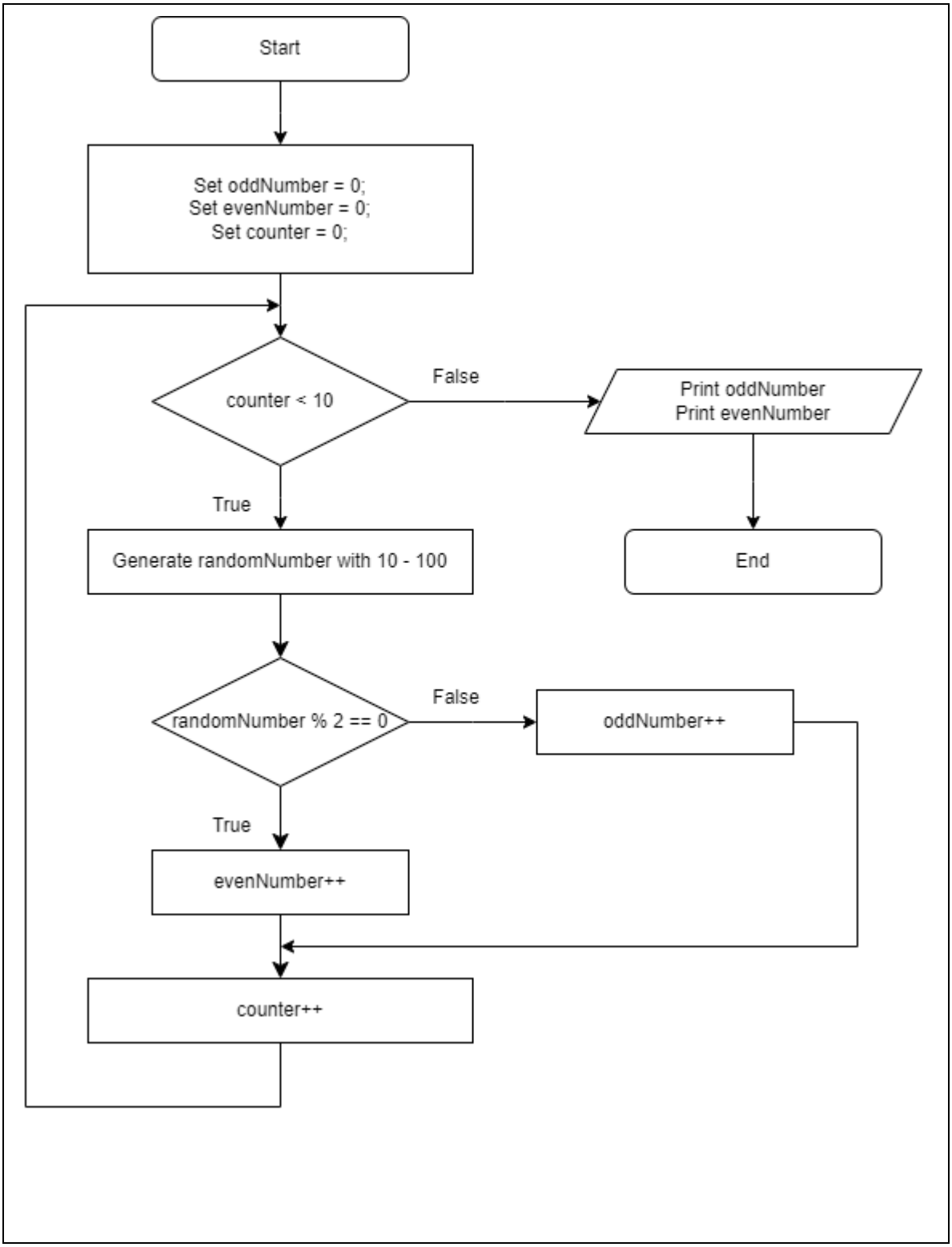
Flow Chart



Part II

8. Count the number of alphabet U and M from a sentence entered by user.

INPUT	PROCESS	OUTPUT
• sentence	Count the number of alphabet U and M from a sentence	• The number of alphabet U and M

Pseudocode

```
Get a sentence from the user.
Set alphabetU as 0 and alphabetM as 0
Set an index that points to the first character of the sentence
while the index is less than the length of the sentence
  read the character according to the index
  if the character is U
     increase the alphabetU by 1
  otherwise if the character is M
     increase the alphabetM by 1
Increase index by 1
Print the number of alphabet U and M
```

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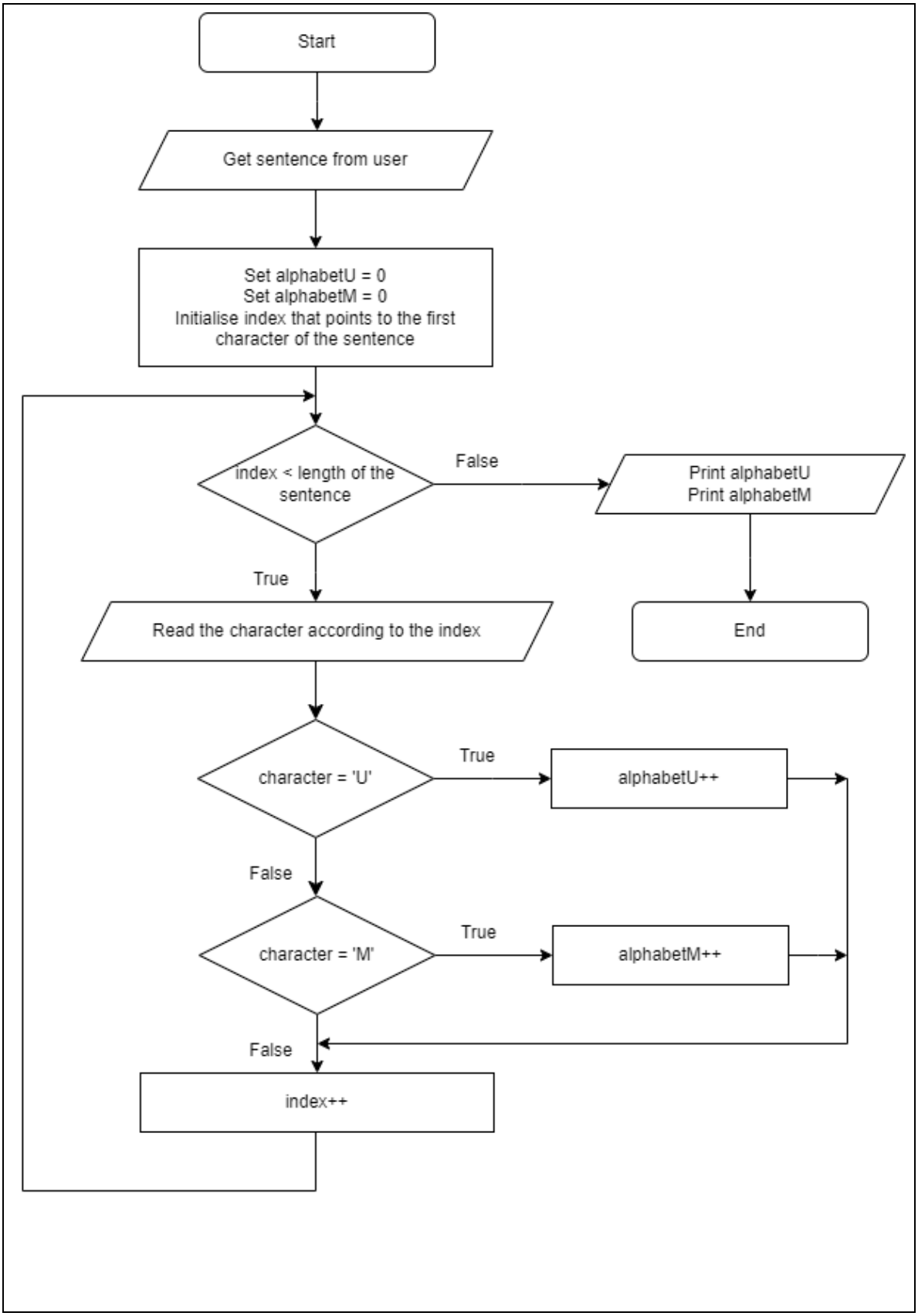
Flow Chart



9. Display the frequency of a keyword from a web page.

INPUT	PROCESS	OUTPUT
• keyword • content	Calculate the frequency of a keyword	• frequency

Pseudocode

```
Set frequency as 0
Get a keyword from the user
Read content from a web page
while the web page is not end of the file
  read one line from the page
  for each word in the line
    if the word is equal to the keyword
      increase the frequency by 1
Print the frequency of the keyword
```

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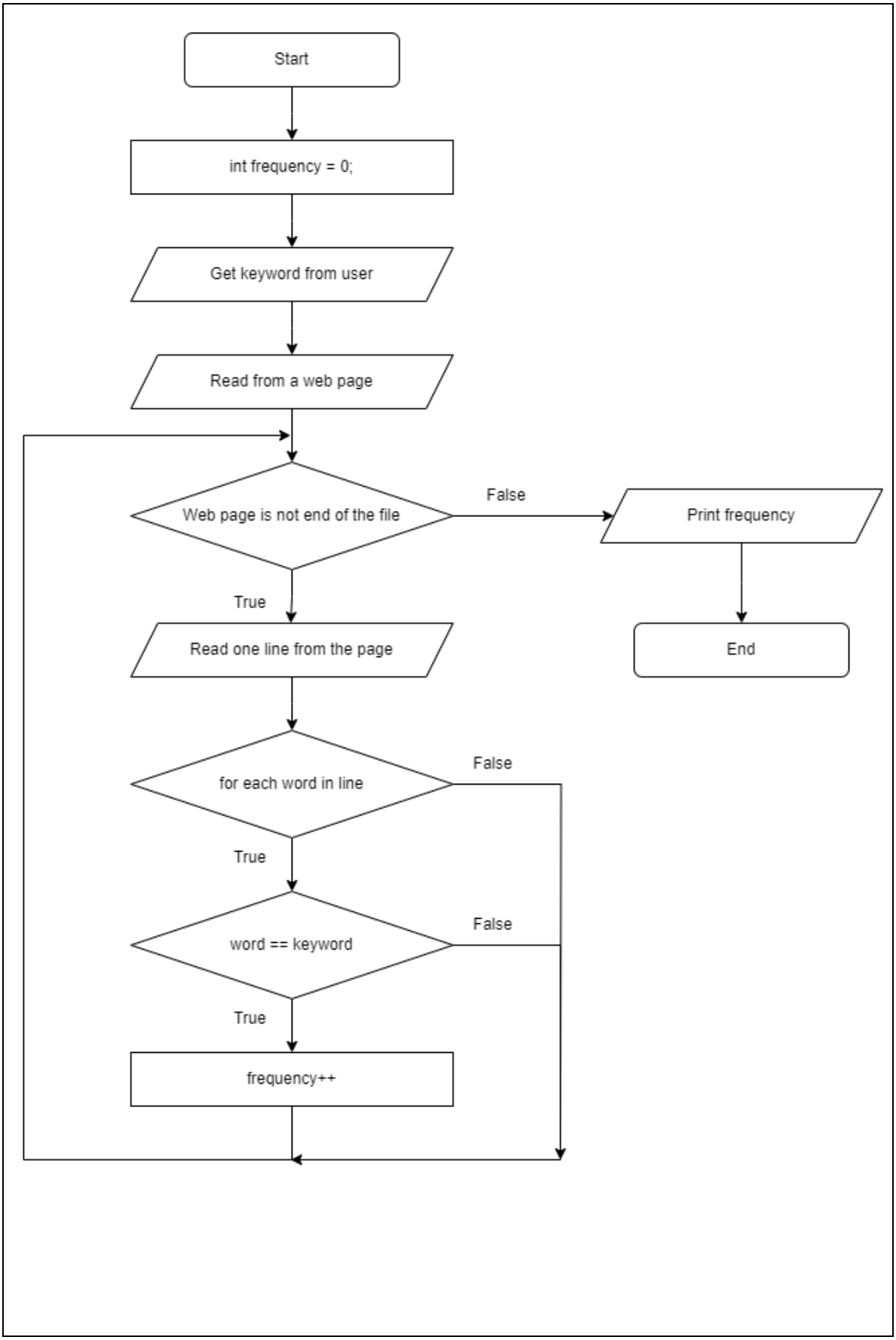
Flow Chart



10. Display the number of female student from a random list of 100 students.

INPUT	PROCESS	OUTPUT
-	Calculate the number of female student	• The number of female students

Pseudocode

```
Set counter as 0
Set female as 0
Set male as 0
while the counter is less than 100
  Generate a random number between 0 and 1
  if the random number is equal to 0
     increase the female by 1
  otherwise
     increase the male by 1
  increase the counter by 1
Print the number of female student
```

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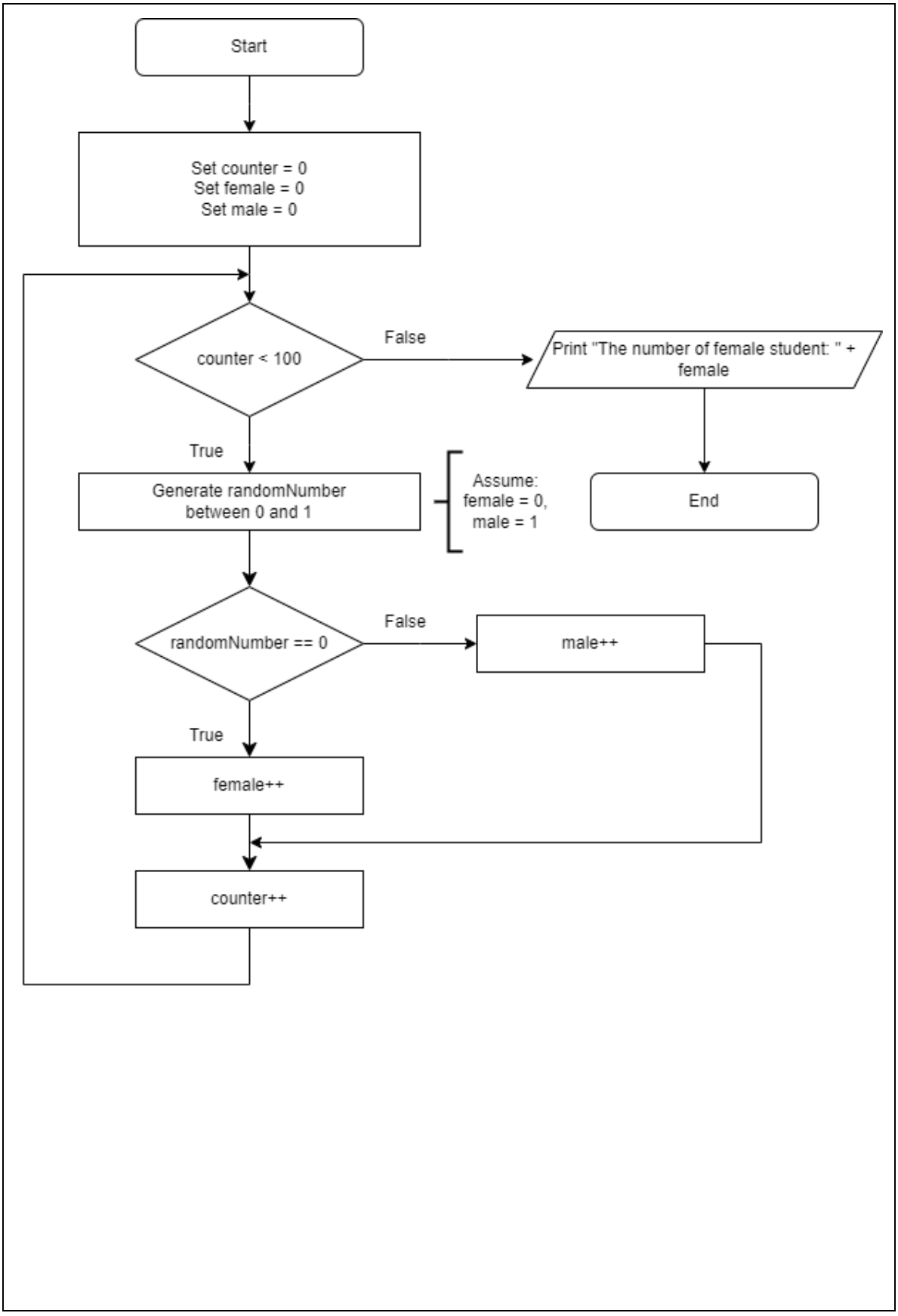
Flow Chart



11. Display a list of 5 random numbers in descending order. (Sort)

INPUT	PROCESS	OUTPUT
-	Sort the numbers in descending order	• Numbers in descending order

Pseudocode

```
Declare array of size 5
Set a counter as 0
Set i as 0
Set j as 0
Set temp as 0
Set n as length of the array
while the counter is less than 5
  Generate a random number
  Store the number in the array
  Increase the counter by 1
while the i is less than n that is minus by 1
  while the j is less than n that is minus by n and 1
    if the current number is less than the next number
      assign the current number to the temporary number
      assign the next number to the current number
      assign the temporary number to the next number
  increase i by 1

Set k as 0
While k is less than n
  Print array[k] + " "
increase k by 1
```

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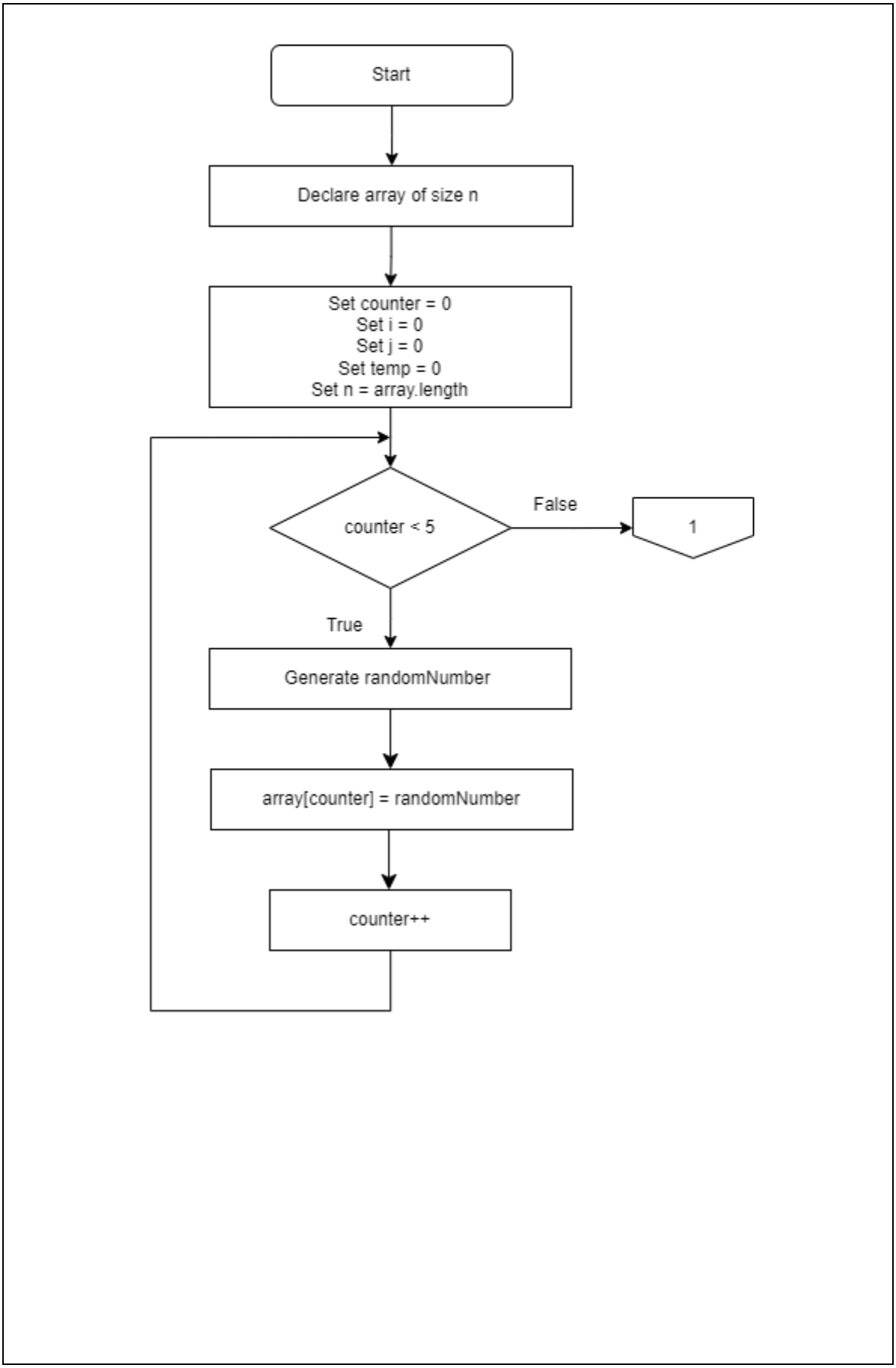
Flow Chart



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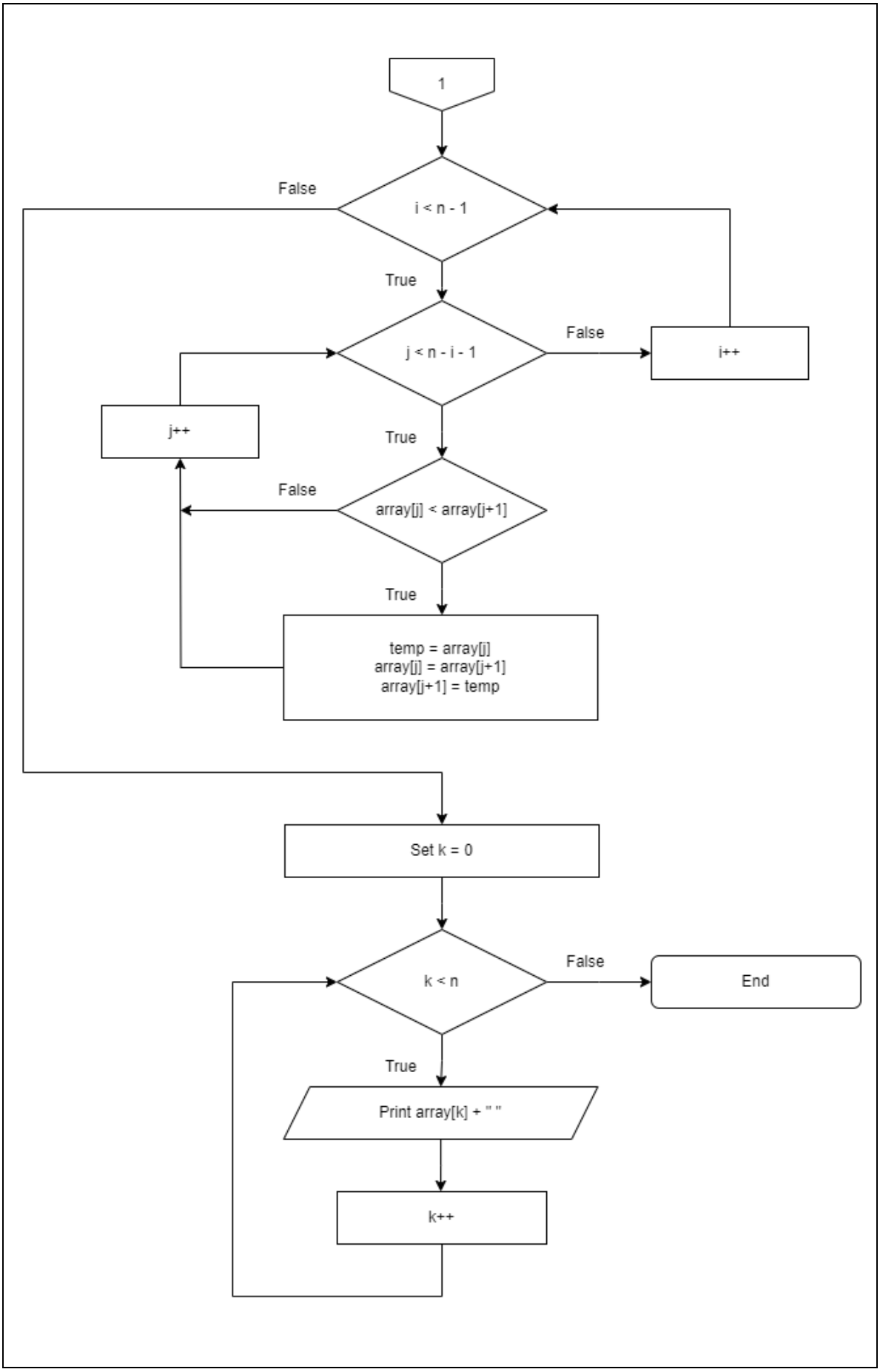

12. Guess a random number generated by computer.

INPUT	PROCESS	OUTPUT
• Number	Give hints until user makes a successful guess	• Too High • Too Low • You have made a successful guess

Pseudocode

```
Generate a random number
Get a number from the user
while the guess number is not equal to the random number
  if the guess number is greater than the random number
     Print “Too High”
  Otherwise
     Print “Too Low”
   Get another number from the user
Print “You have made a successful guess.”
```

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Flow Chart