**CSD 1133 – 2023S**
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**Assignment # 5, Pseudocode, and flowchart**
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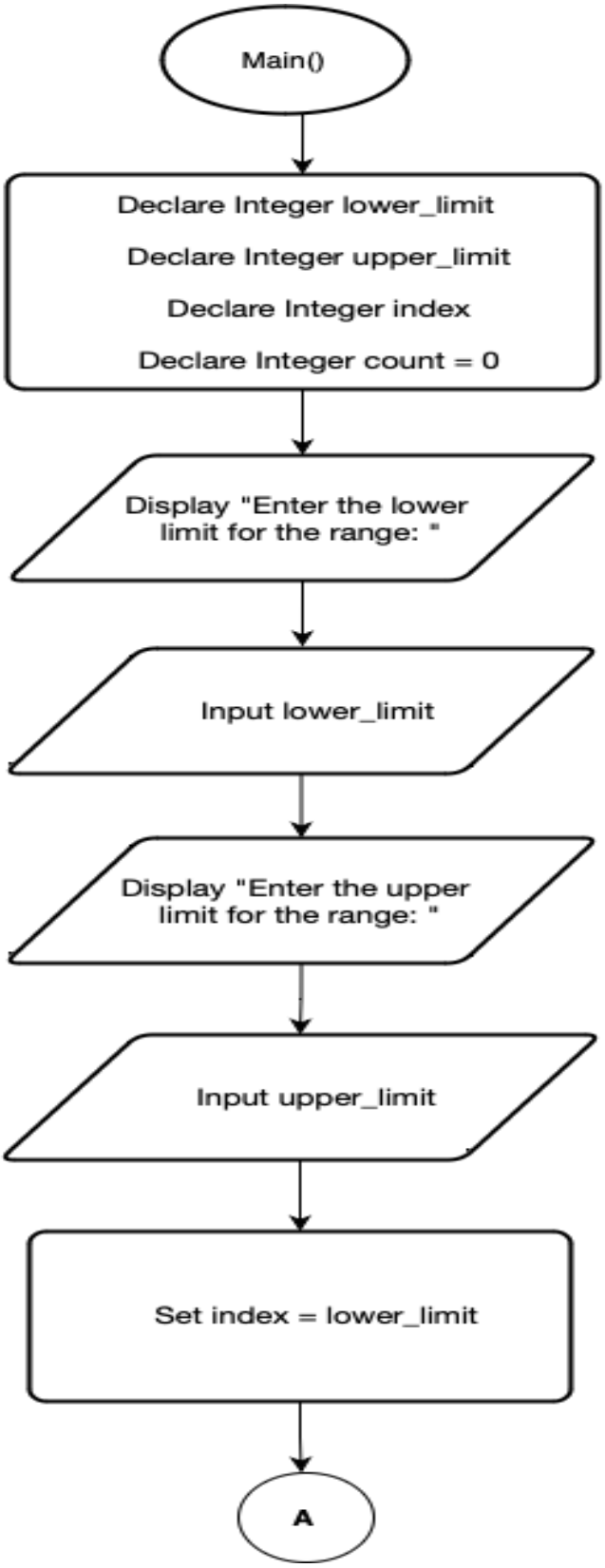
**Question:** RSA Numbers
When a credit card number is sent through the Internet it must be protected so that other people cannot see it. Many web browsers use a protection based on "RSA Numbers."
A number is an RSA number if it has exactly four divisors. In other words, there are exactly four numbers that divide into it evenly. For example, 10 is an RSA number because it has exactly four divisors (1, 2, 5, 10). 12 is not an RSA number because it has too many divisors (1, 2, 3, 4, 6, 12). 11 is not an RSA number either. There is only one RSA number in the range 10...12. Write a program that inputs a range of numbers and then counts how many.
numbers from that range are RSA numbers.
Program Output: Enter lower limit of range User Input: 10
Program Output: Enter upper limit of range User Input: 12
Program Output: The number of RSA numbers between 10 and 12 is 1.

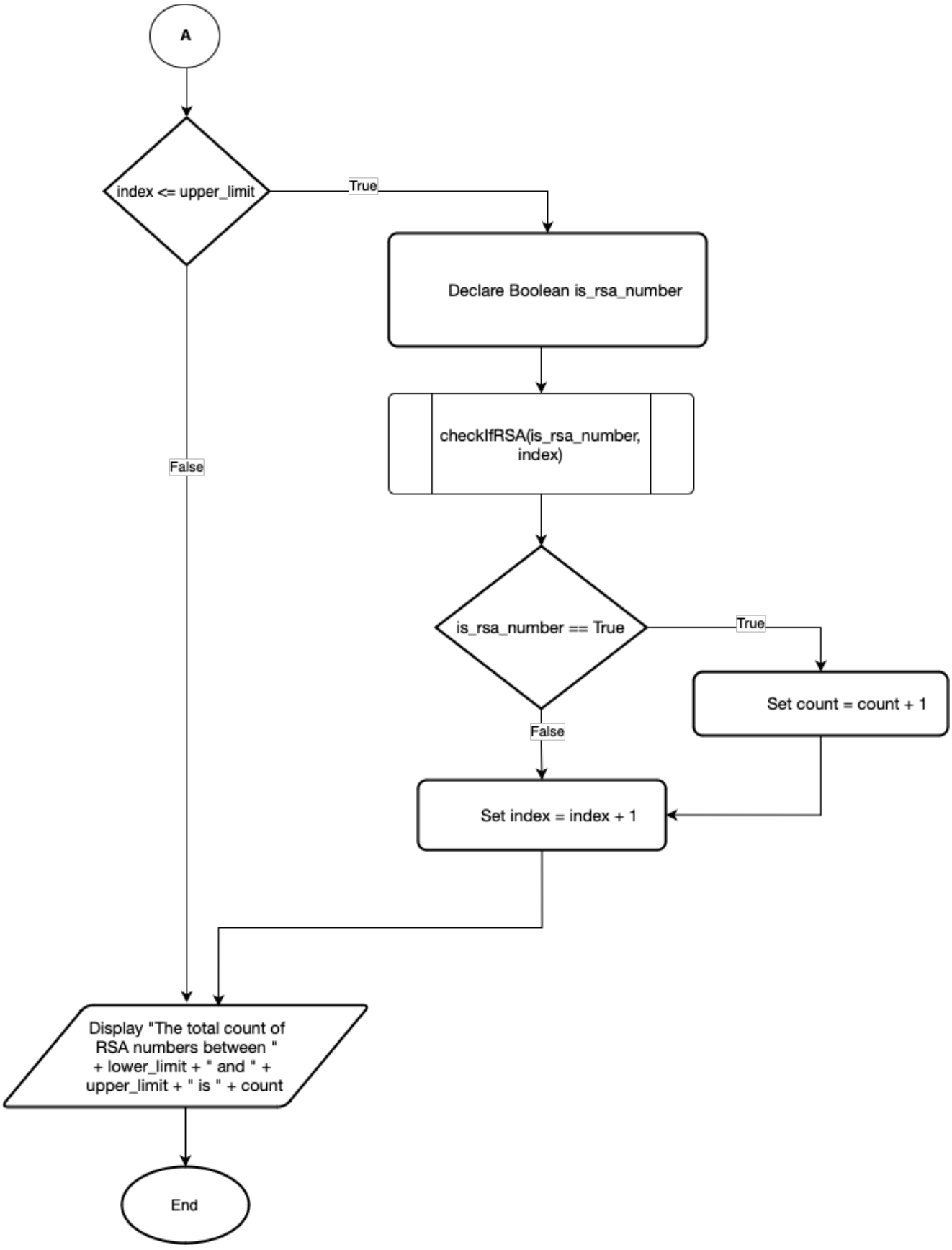
**Pseudocode:**

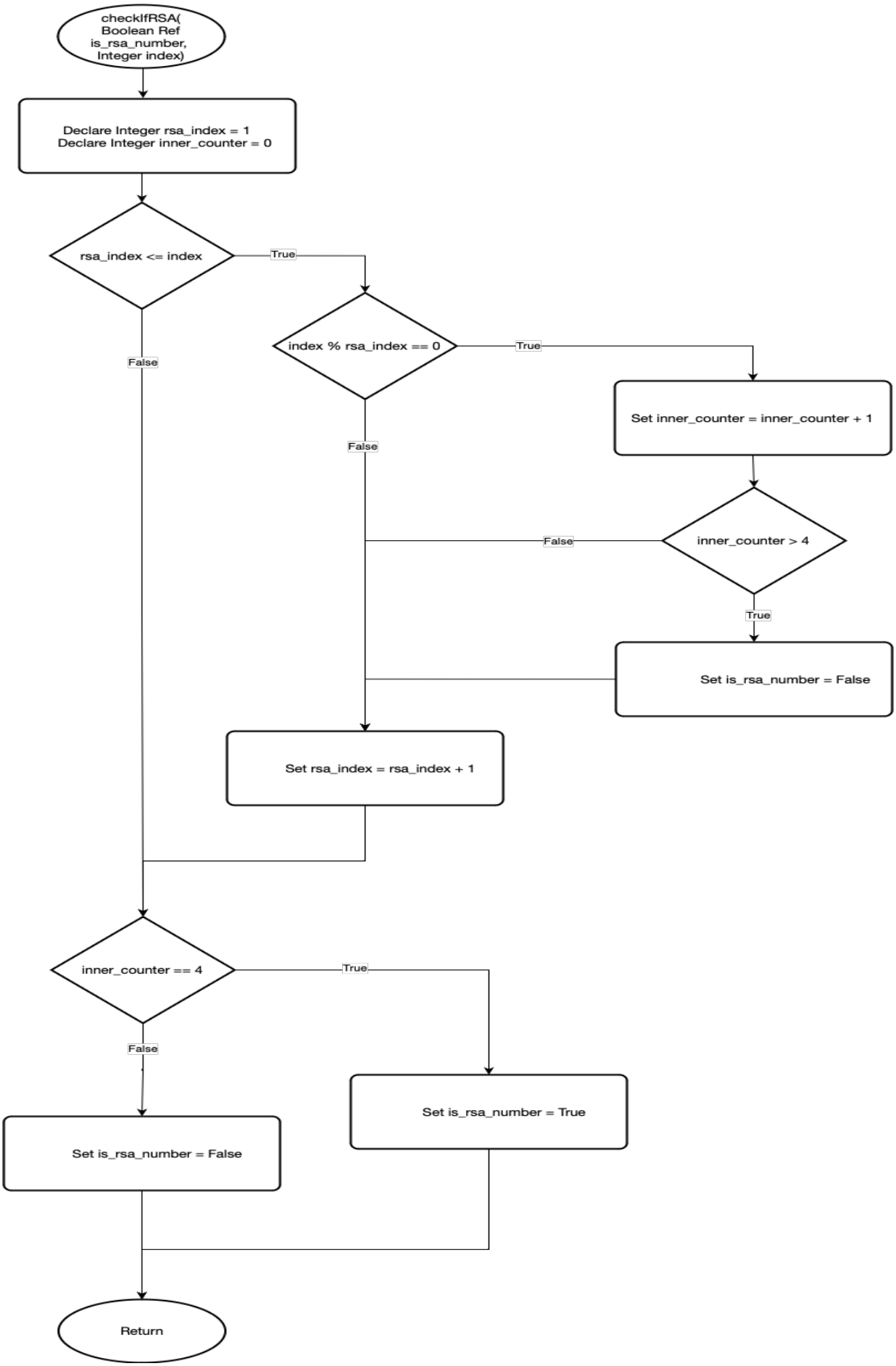
```
// Main module, the entry point of the program
Module Main()
   //Declare variables for lower limit, upper limit, index, and count
   Declare Integer lower_limit
   Declare Integer upper_limit
   Declare Integer index
   Declare Integer count = 0

   //Prompt the user to enter the lower limit for the range and store in lower_limit variable
   Display "Enter the lower limit for the range: "
   Input lower_limit

   //Prompt the user to enter the upper limit for the range and store in upper_limit variable
   Display "Enter upper limit for the range: "
   Input upper_limit

   // Set the initial value of the index to the lower limit
   Set index = lower_limit

   //Iterate through the range from lower_limit to upper_limit
   While index <= upper_limit
      //Declare a boolean variable to store if the number is an RSA number
      Declare Boolean is_rsa_number = False
      //Call the checkIfRSA module
      Call checkIfRSA(is_rsa_number, index)

      //Check if the number is an RSA number and increment the count if true
```

```
        If is_rsa_number == True Then
            Set count = count + 1
        End If

        //Increment the index to forward the loop to the next number in the range
        Set index = index + 1
    End While

    //Display the count of RSA numbers found in the range
    Display "The total count of RSA numbers between "+ lower_limit + " and " + upper_limit + "
is " + count
End Module

// Module checkIfRSA, to determine if the passed index is RSA number
Module checkIfRSA(Boolean Ref is_rsa_number, Integer index)
    //Declare variables for rsa_index and inner_counter
    Declare Integer rsa_index = 1
    Declare Integer inner_counter = 0

    //Iterate from rsa_index to index
    While rsa_index <= index
        //Check if the current index is a divisor of the number
        If index % rsa_index == 0 Then
            //Increment the inner_counter if the current index is a divisor
            Set inner_counter = inner_counter + 1

            //Check if the number of divisors exceeds 4
            If inner_counter > 4 Then
                //Set is_rsa_number to False if the number of divisors exceeds 4
                Set is_rsa_number = False
            End If
        End If

        //Move to the next divisor
        Set rsa_index = rsa_index + 1
    End While

    //Check if the number has exactly 4 divisors
    If inner_counter == 4 Then
        //Set is_rsa_number to True if the number has exactly 4 divisors
        Set is_rsa_number = True
    Else
        //Set is_rsa_number to False if the number does not have exactly 4 divisors
        Set is_rsa_number = False
    End If
End Module
```

**Flow chart:**


Main()
Declare Integer lower_limit
Declare Integer upper_limit
Declare Integer index
Declare Integer count = 0
Display "Enter the lower limit for the range: "
Input lower_limit
Display "Enter the upper limit for the range: "
Input upper_limit
Set index = lower_limit
A


A
index <= upper_limit
True
False
Declare Boolean is_rsa_number
checkIfRSA(is_rsa_number, index)
is_rsa_number == True
True
Set count = count + 1
False
Set index = index + 1
Display "The total count of RSA numbers between " + lower_limit + " and " + upper_limit + " is " + count
End


checkIfRSA(
Boolean Ref
is_rsa_number,
Integer index)
Declare Integer rsa_index = 1
Declare Integer inner_counter = 0
rsa_index <= index
True
False
index % rsa_index == 0
True
False
Set inner_counter = inner_counter + 1
inner_counter > 4
False
True
Set is_rsa_number = False
Set rsa_index = rsa_index + 1
inner_counter == 4
True
False
Set is_rsa_number = True
Set is_rsa_number = False
Return