

C++ LAUNCHPAD



Lecture-1

FUNDAMENTALS

- Basics of Problem Solving
- Flowcharts, PseudoCode

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Course Structure

- Basics of Problem Solving
- Programming Fundamentals
- Object Oriented Programming
- Data Structures

Course Administration

- Online Class (www.online.codingblocks.com)
- Regular Assignments
PDF +ONLINE Tool (www.hack.codingblocks.com)
- Laptops



BT - 1: Hour Glasses

You have two hourglasses: a 7 minute one and a 11 minute one. Using just two hourglass, **accurately time 15 minutes.**

Flowcharts!

What is a flowchart?

- Diagrammatic representation illustrating a solution to a given problem.
- Allows you to break down any process into smaller steps and display them in a visually pleasing way
- It shows steps as boxes of various kinds, and their order by connecting them with arrows.
- It helps your audience to see the logical flow and relationship between steps.

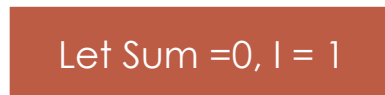
Flowchart components



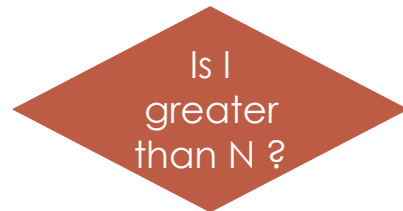
Initializer / Terminator



Input / Output



Process



Decision



Arrow



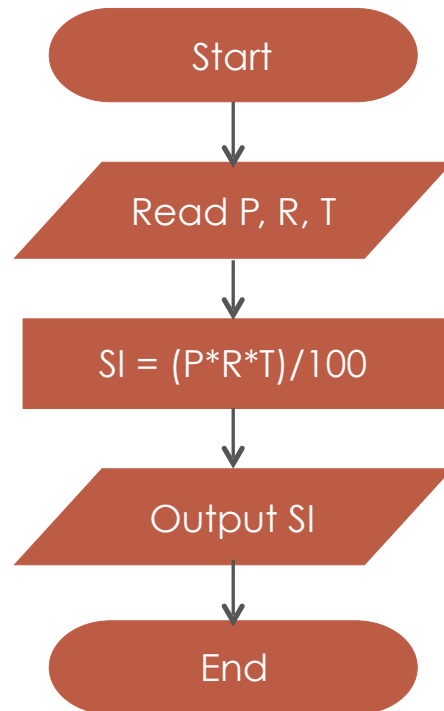
Connector



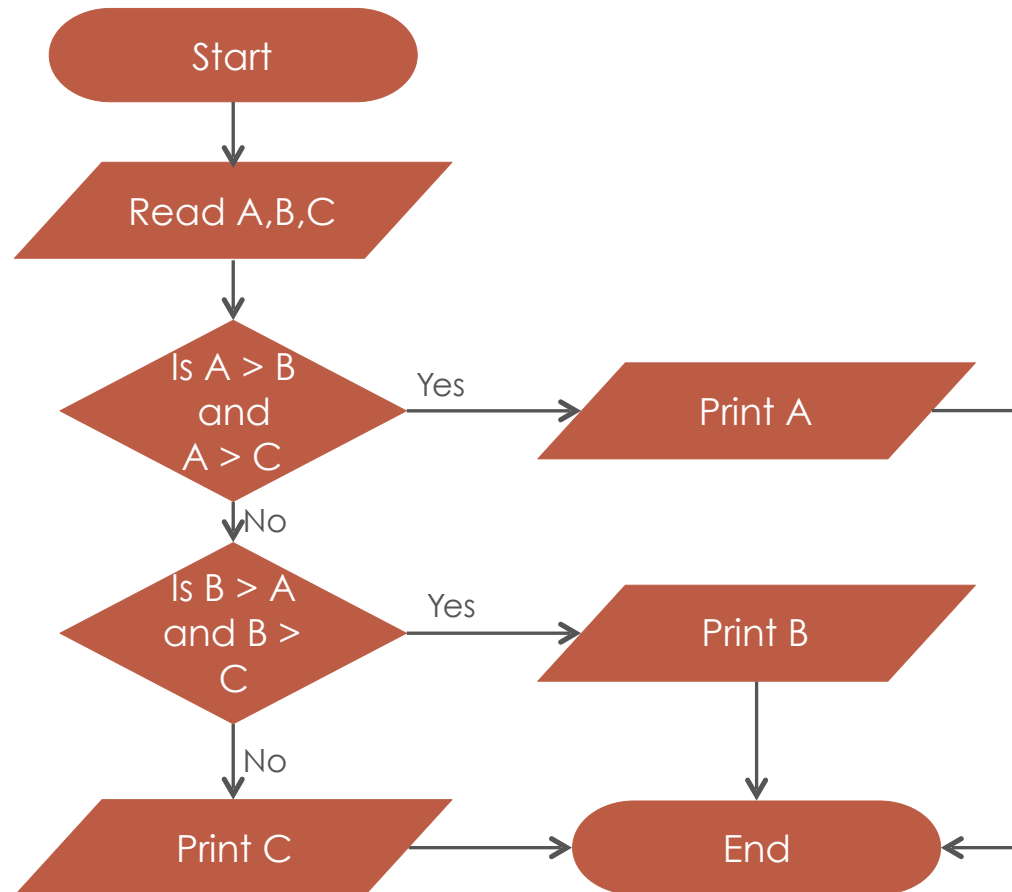
Lets look at few problems and their flowcharts!



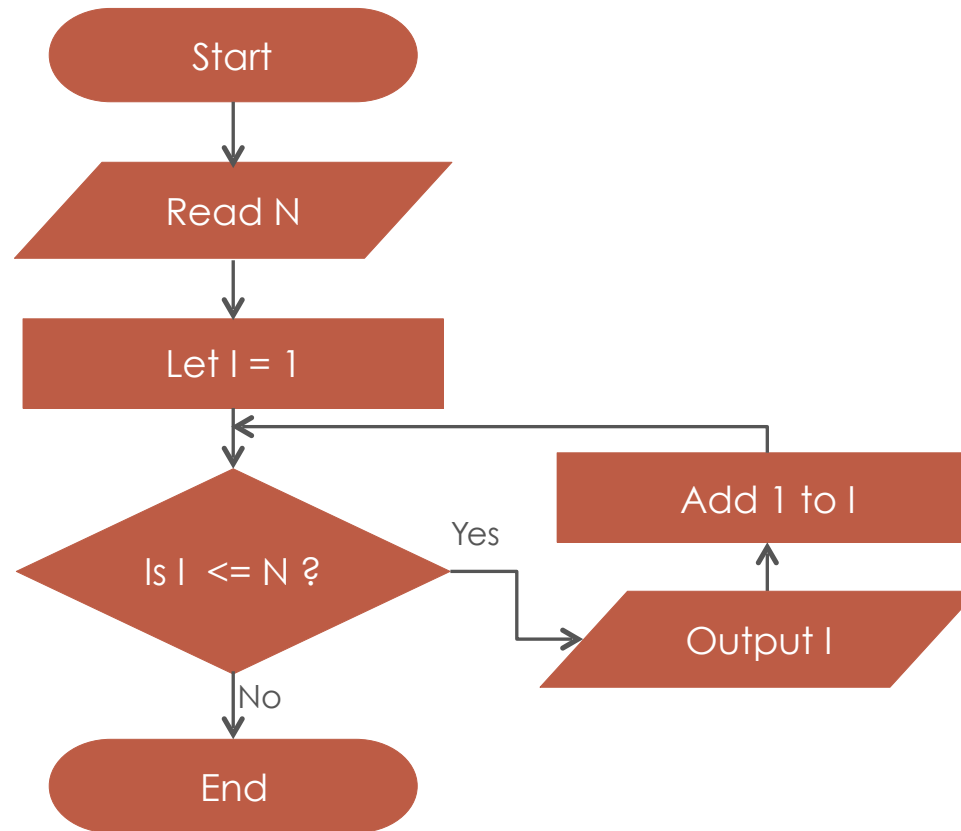
Read Principal, Rate & Time and Print SI



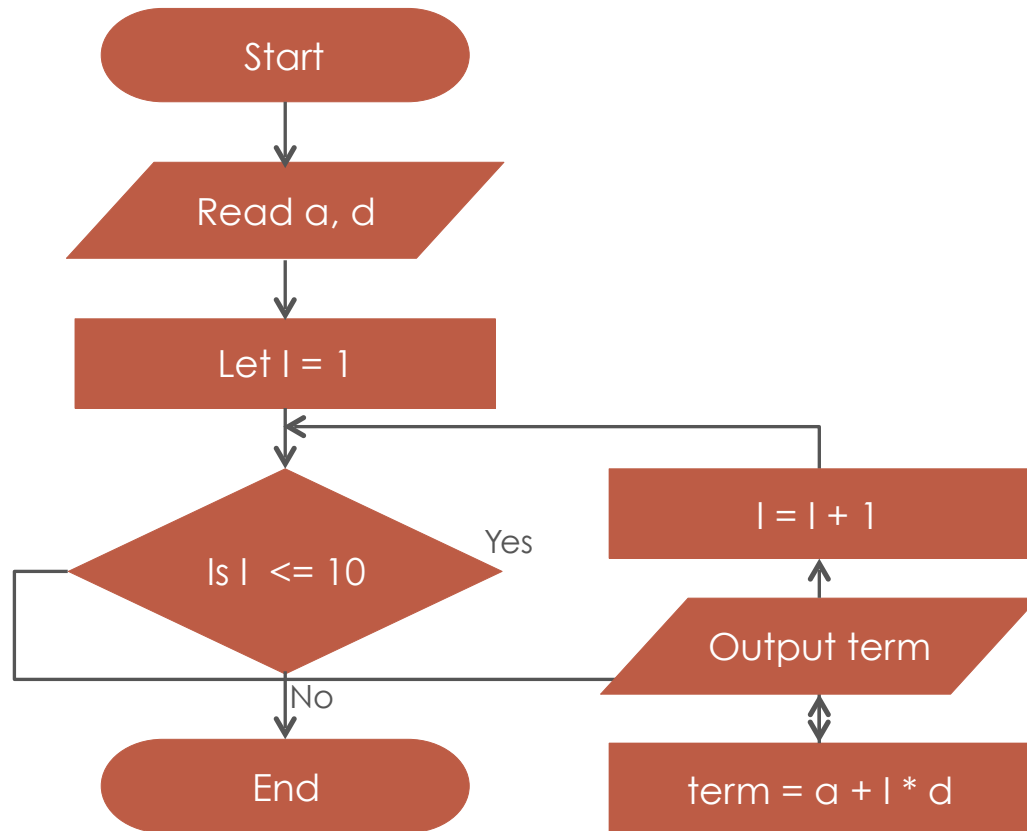
Find largest of three numbers



Given N, print all numbers from 1 to N



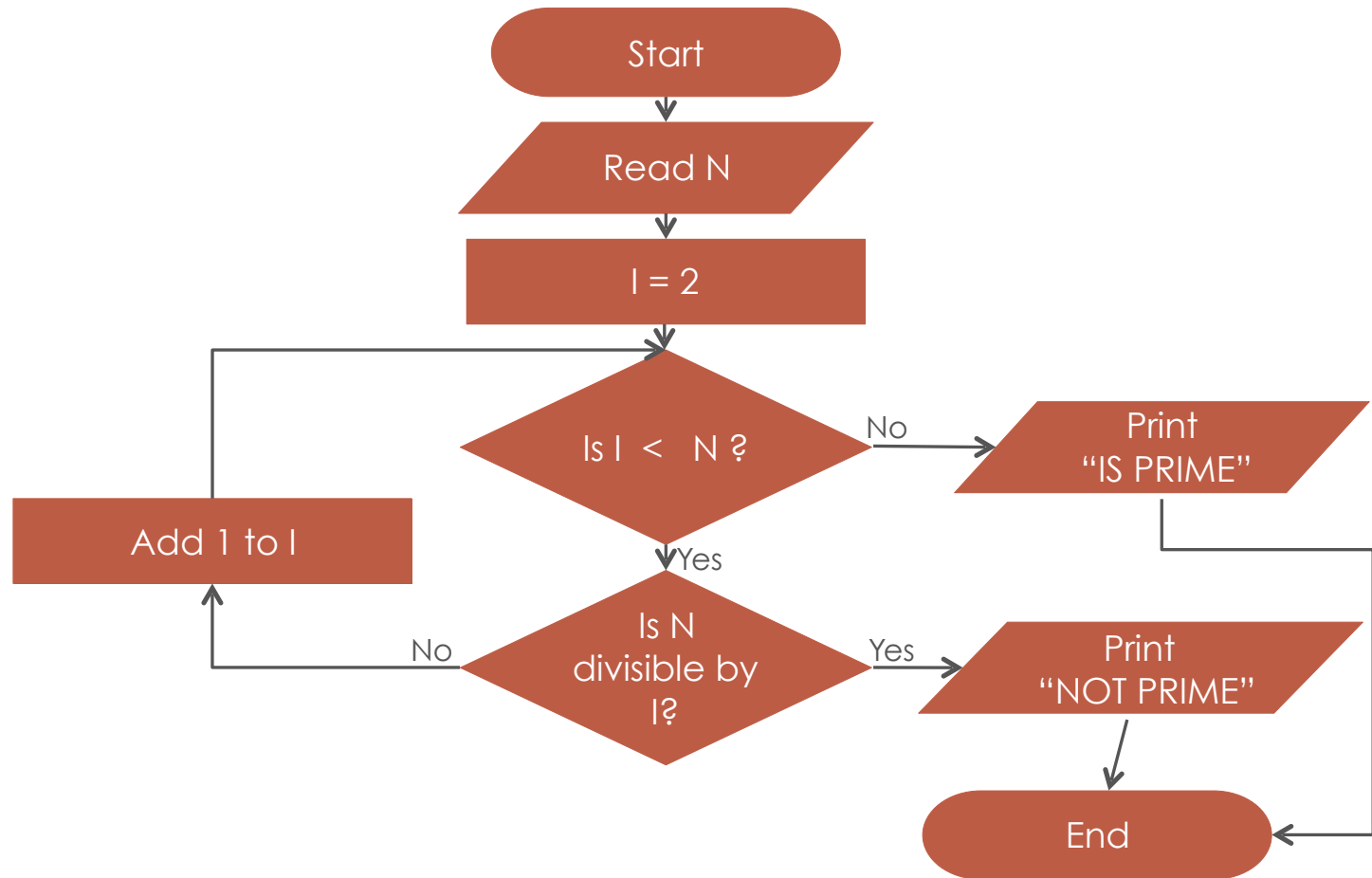
Read a & d, print 10 numbers of form
 $a+d$, $a+2d$, $a+3d$...



Time to try?

- Read five numbers and print their average
- Given N, find sum of even numbers from 1 to N
- Given N, check if its prime or not

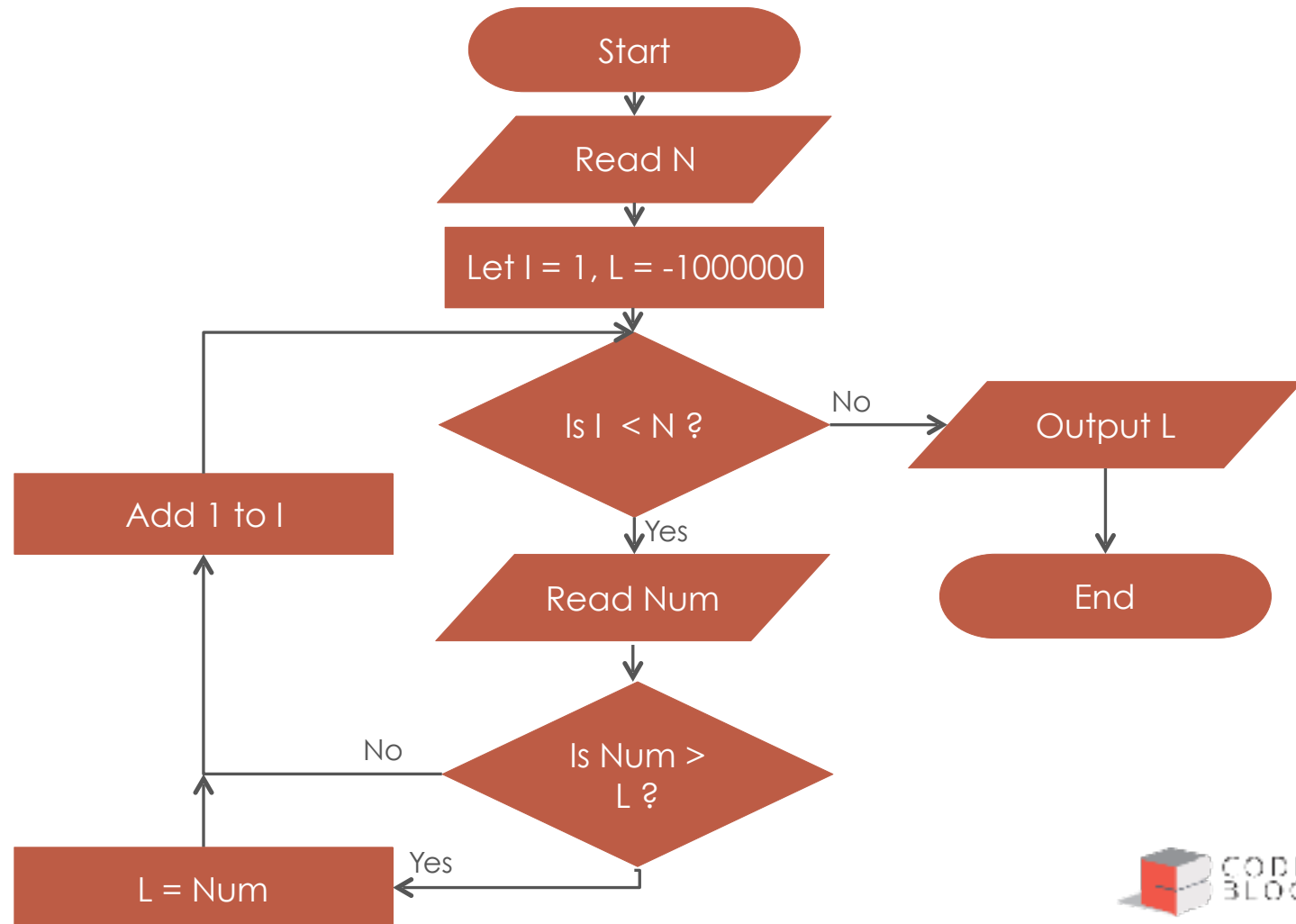
Check if a number is prime or not?



Some more examples!



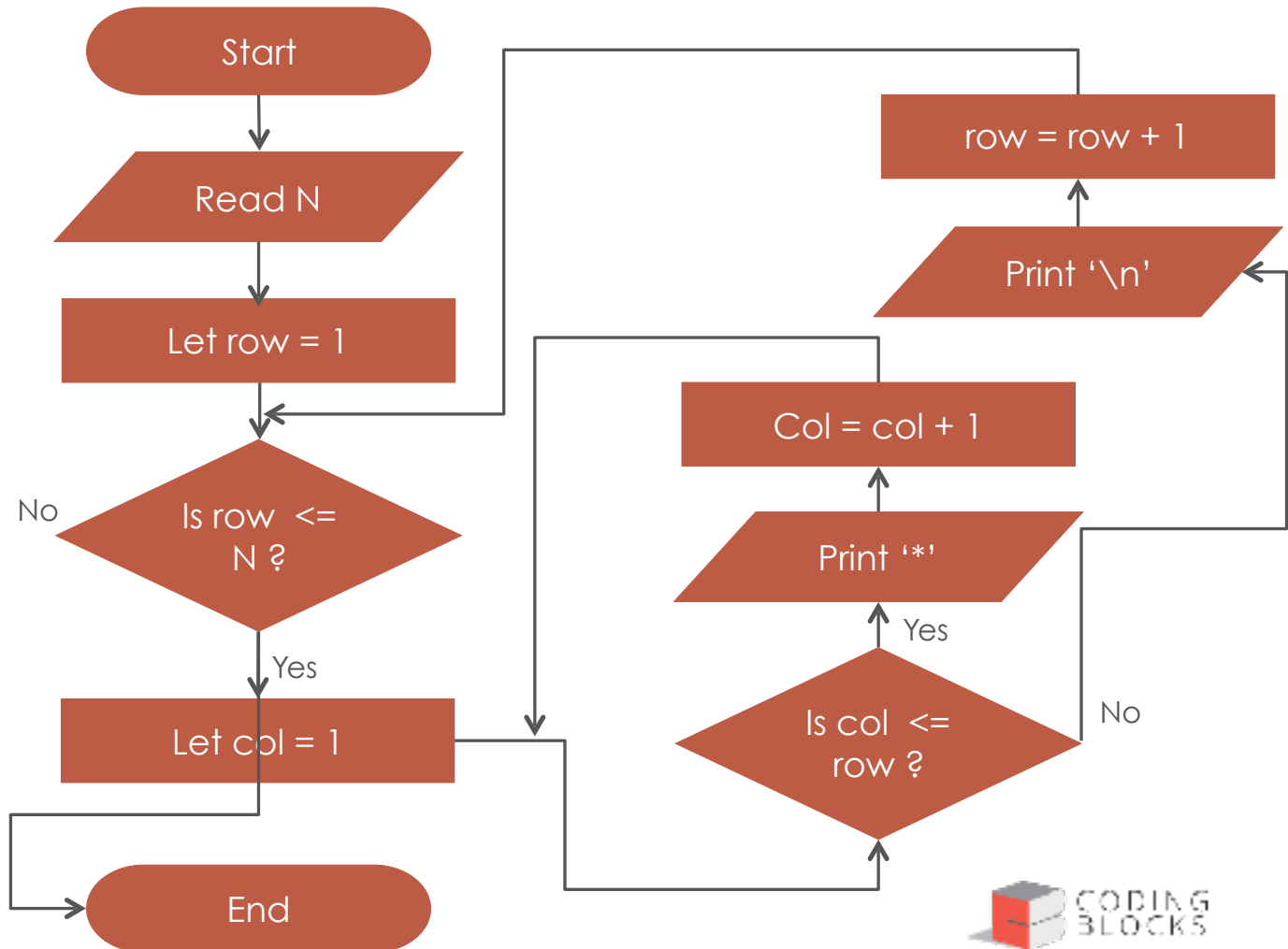
Find largest of N numbers



Print the below pattern

*

**



Time to try?

- Given a list of N integers, find mean, maximum and minimum value. You would be given first N, and then N integers of the list.
- Given a number check if it is a member of Fibonacci sequence or not
- Read N, and print the following pattern

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

BT – 2: Apples and Oranges

There are three closed and opaque cardboard boxes. One is labeled "APPLES", another is labeled "ORANGES", and the last is labeled "APPLES AND ORANGES". You know that the labels are currently disarranged, such that no box is correctly labeled. You would like to correctly rearrange these labels. To accomplish this, you may draw only one fruit from one of the boxes. **Which box do you choose, and how do you then proceed to rearrange the labels?**



Pseudocode!

What is pseudocode?

- Human readable information/
description of an algorithm or a
program

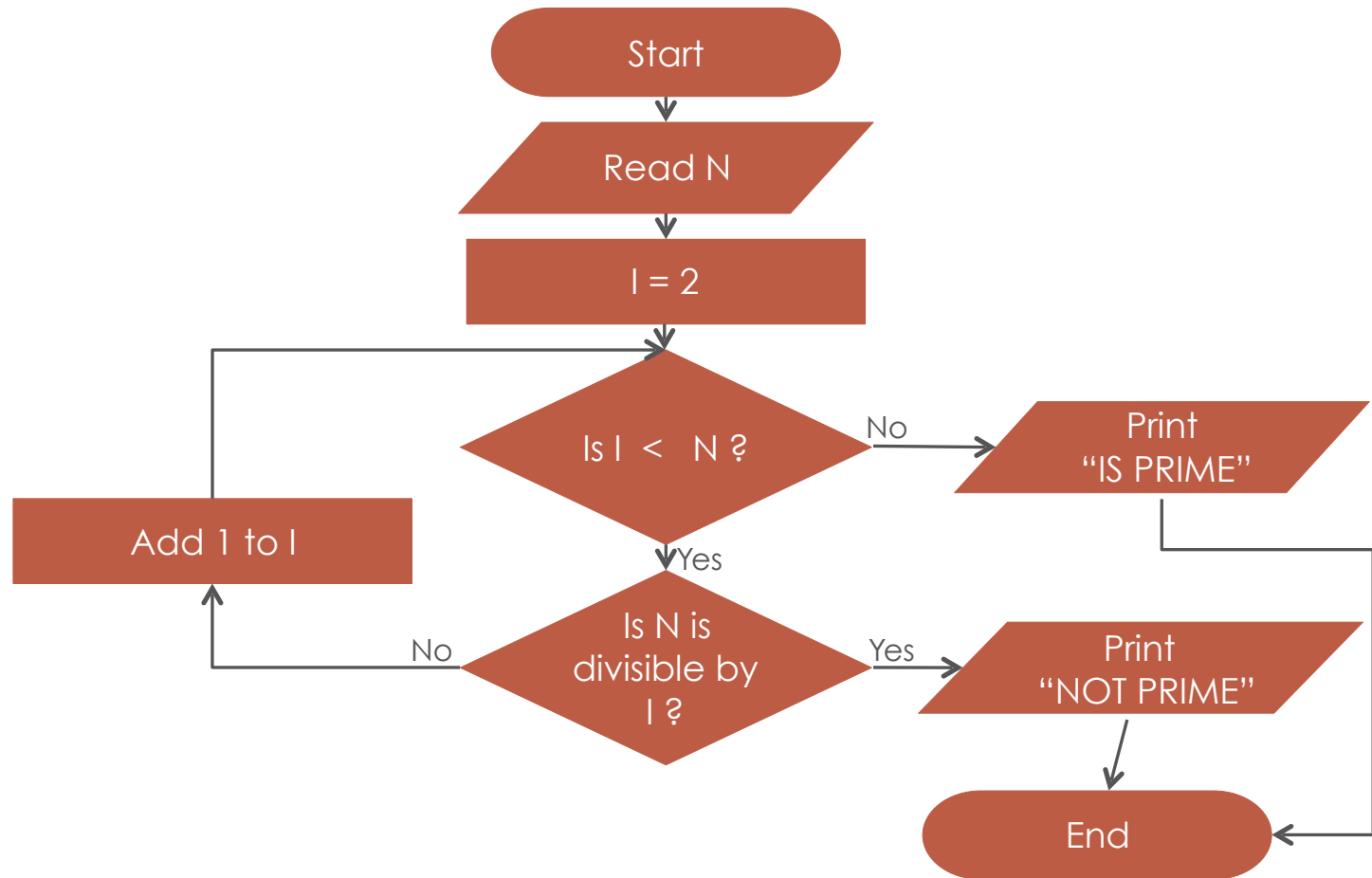
Notation for those basic six!

- Reading/Receiving [read N]
- Outputting/Printing [print Sum, print "Coding Blocks", print 1, print '\n']
- I. Assignment [Sum \leftarrow 5]
- II. Arithmetic operators [a+b, a * 5, sum + i]
- If Else [if I < N then ... else then ... endif]
- While Loop [while I < N do ... endwhile]

Lets convert some flowcharts into pseudocode!



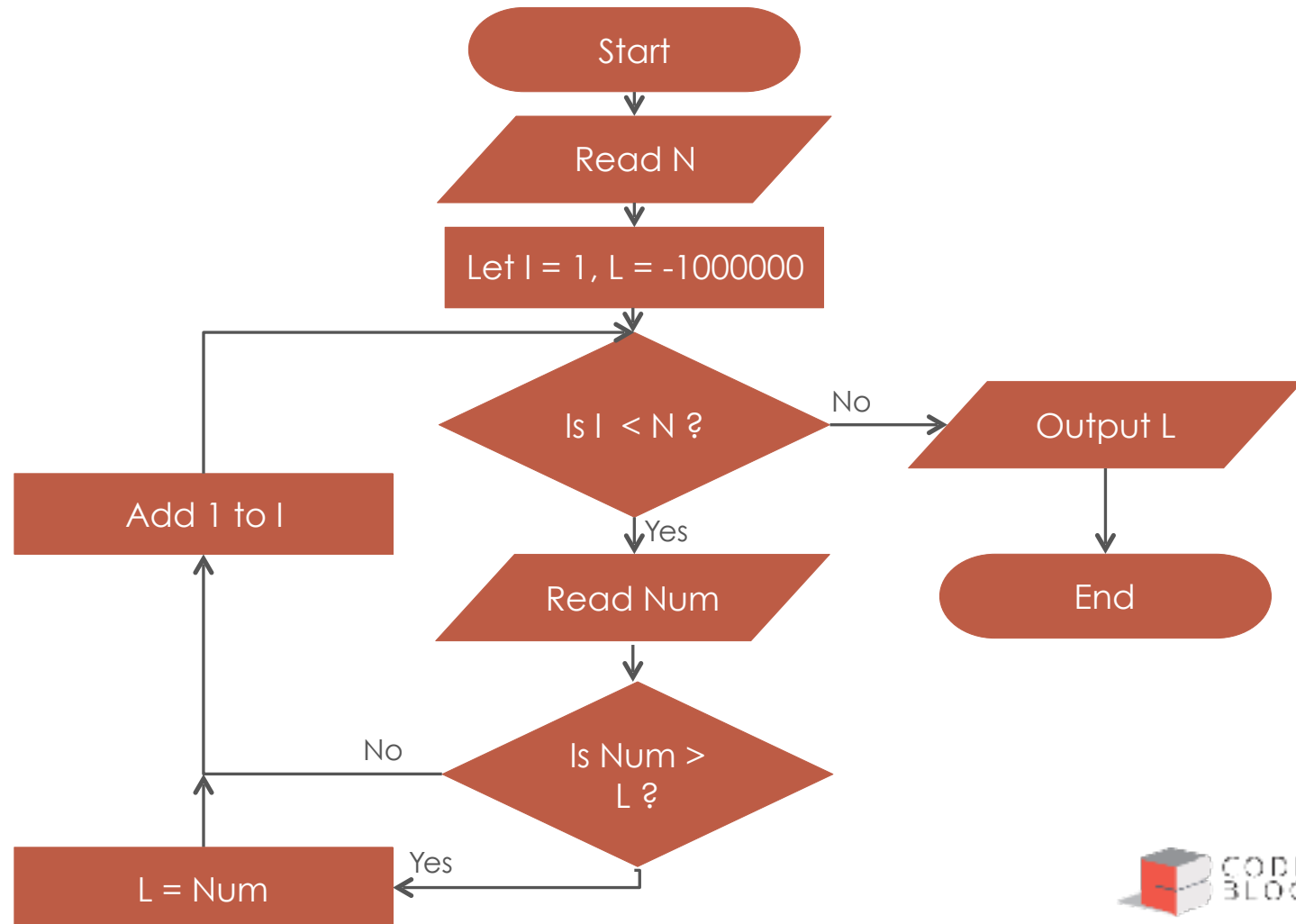
Check if a number is prime or not?



Pseudocode- Check if N is prime?

```
read N
I ← 2
While I < N do
    if N is divisible by I then
        print "NOT PRIME"
        exit
    endif
I ← I + 1
endwhile
print "IS PRIME"
exit
```

Find largest of N numbers



Pseudocode –Largest of N numbers

read N

$I \leftarrow 1, L \leftarrow -100000$

while $I < N$ do

 read num

 if num > L then

$L \leftarrow \text{num}$

 endif

$I \leftarrow I + 1$

endwhile

print L

exit



BT – 3: Average Salary

Three coworkers would like to know their average salary. However, they are self-conscious and don't want to tell each other their own salaries, for fear of either being ridiculed or getting their houses robbed. **How can they find their average salary, without disclosing their own salaries?**

BT – 4: Criminal Cupbearers

An evil king has 1000 bottles of wine. A neighbouring queen plots to kill the bad king, and sends a servant to poison the wine. The king's guards catch the servant after he has only poisoned one bottle. The guards don't know which bottle was poisoned, but they do know that the poison is so potent that even if it was diluted 1,000,000 times, it would still be fatal. Furthermore, the effects of the poison take one month to surface. The king decides he will get some of his prisoners in his vast dungeons to drink the wine. **Rather than using 1000 prisoners each assigned to a particular bottle, this king knows that he needs to murder no more than 10 prisoners to figure out what bottle is poisoned, and will still be able to drink the rest of the wine in 5 weeks time. How does he pull this off?**



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Thank You!

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