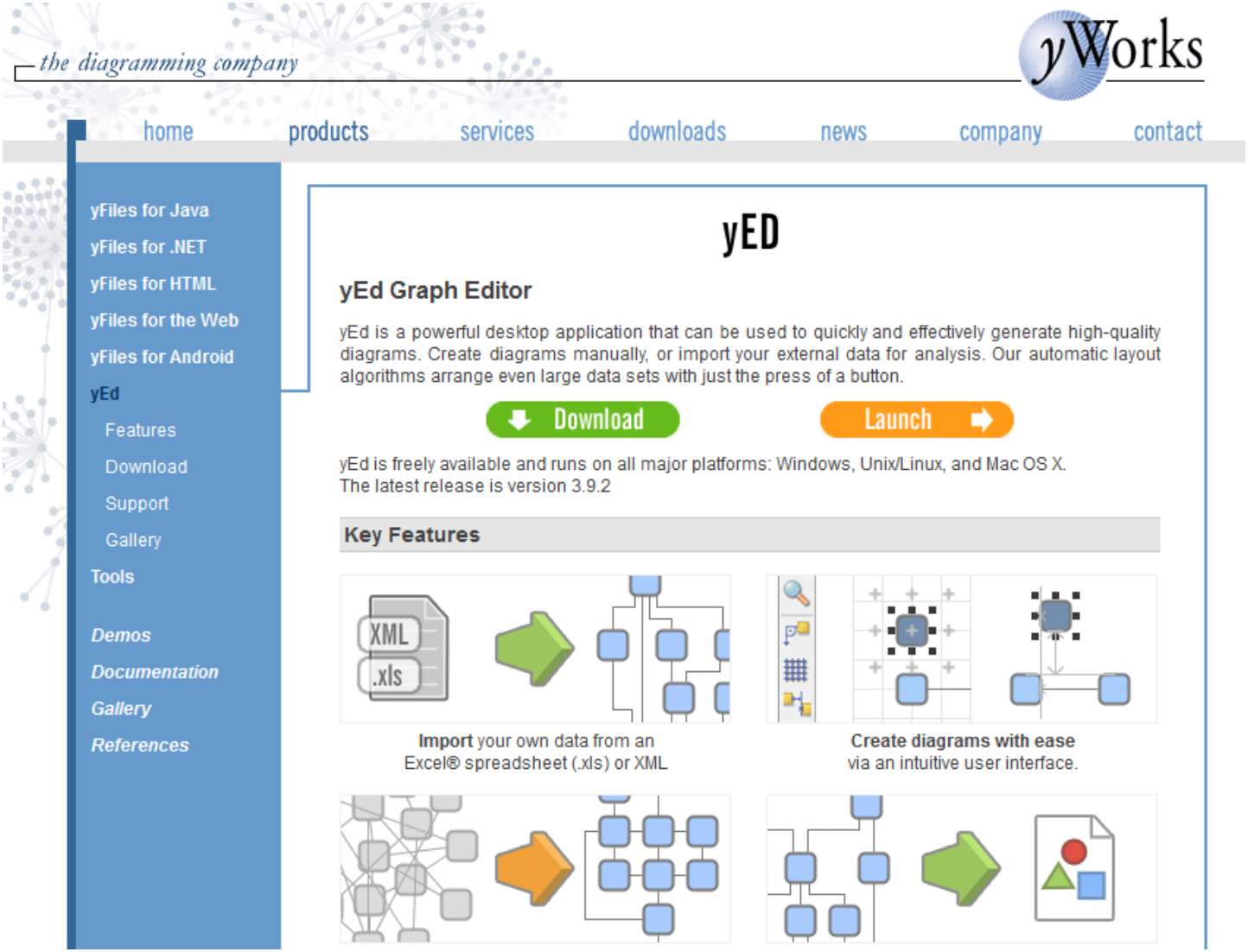
8. Flowcharts 3

What did we do last time?

Program Design

OPEN SOURCE DIAGRAM TOOLS

yED



http://www.yworks.com/en/products_yed_about.html

Dia Portable

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diagramming to go

Dia is roughly inspired by the commercial Windows program Visio, though more geared towards informal diagrams for casual use. It can be used to draw many different kinds of diagrams and has special objects to help draw entity relationship diagrams, UML diagrams, flowcharts, network diagrams, and many other diagrams. It's packaged as a portable app, so you can do your technical drawing wherever you are.

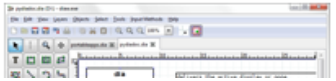
Download Now
sourceforge - Trusted for Open Source
Version 0.97.2 for Windows, Multilingual
15MB download / 25-52MB installed (Details)

Make a Donation - Support PortableApps.com's development and hosting

Dia Portable works best with the PortableApps.com Platform

Features

Dia is a full-featured diagramming program. It can be used to draw many different kinds of diagrams and has special objects to help draw entity relationship diagrams,



http://portableapps.com/apps/office/dia_portable

Graphviz

Graphviz - Graph Visualization Software

Drawing graphs since 1988

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Password: *

Log in

- Create new account
- Request new password

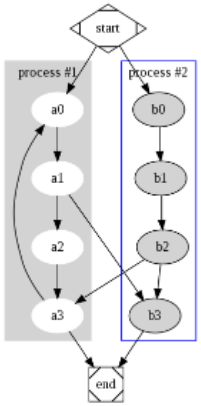
Graphviz

Welcome to Graphviz

Available translations: Belorussian, Romanian, Russian, Russian (more natural?)

What is Graphviz?

Graphviz is open source graph visualization software. Graph visualization is a way of representing structural information as diagrams of abstract graphs and networks. It has important applications in networking, bioinformatics, software engineering, database and web design, machine learning, and in visual interfaces for other technical domains.



Features

The Graphviz layout programs take descriptions of graphs in a simple text language, and make diagrams in useful formats, such as images and SVG for web pages, PDF or Postscript for inclusion in other documents; or display in an interactive graph browser. (Graphviz also supports GXL, an XML dialect.) Graphviz has many useful features for concrete diagrams, such as options for colors, fonts, tabular node layouts, line styles, hyperlinks, rolland custom shapes.

Roadmap

dot "hierarchical" or layered drawings of directed graphs. This is the default tool to use if edges have directionality.

neato "spring model" layouts. This is the default tool to use if the graph is not too large (about 100 nodes) and you don't know anything else about it. Neato attempts to minimize a global energy function, which is equivalent to

Active forum topics

- svg and cmap coordinates seem inconsistent
- html markup in tooltips
- Dot.exe not running under windows 2003 server
- Images in nodes, label below
- Installation on ubuntu

more

New forum topics

- svg and cmap coordinates seem inconsistent
- html markup in tooltips
- Images in nodes, label below
- how to compress a graph?
- Dot.exe not running under windows 2003 server

more

http://www.graphviz.org/

Dia

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live.gnome.org

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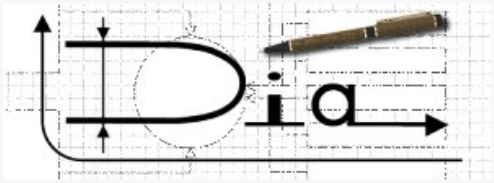

Home	News	Screenshots	Examples	Download	Documentation
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Welcome to Dia's new homepage. Dia is a GTK+ based diagram creation program for GNU/Linux, MacOS X, Unix, and Windows, and is released under the GPL license.

News! 2011-Dec-18: Version 0.97.2 has been released. Visit the Download page to get your copy! (Download shortcuts: Windows,Mac OS X)

Dia is roughly inspired by the commercial Windows program 'Visio,' though more geared towards informal diagrams for casual use. It can be used to draw many different kinds of diagrams. It currently has special objects to help draw entity relationship diagrams, UML diagrams, flowcharts, network diagrams, and many other diagrams. It is also possible to add support for new shapes by writing simple XML files, using a subset of SVG to draw the shape.

It can load and save diagrams to a custom XML format (gzipped by default, to save space), can export diagrams to a number of formats, including EPS, SVG, XFIG, WMF and PNG, and can print diagrams (including ones that span multiple pages).

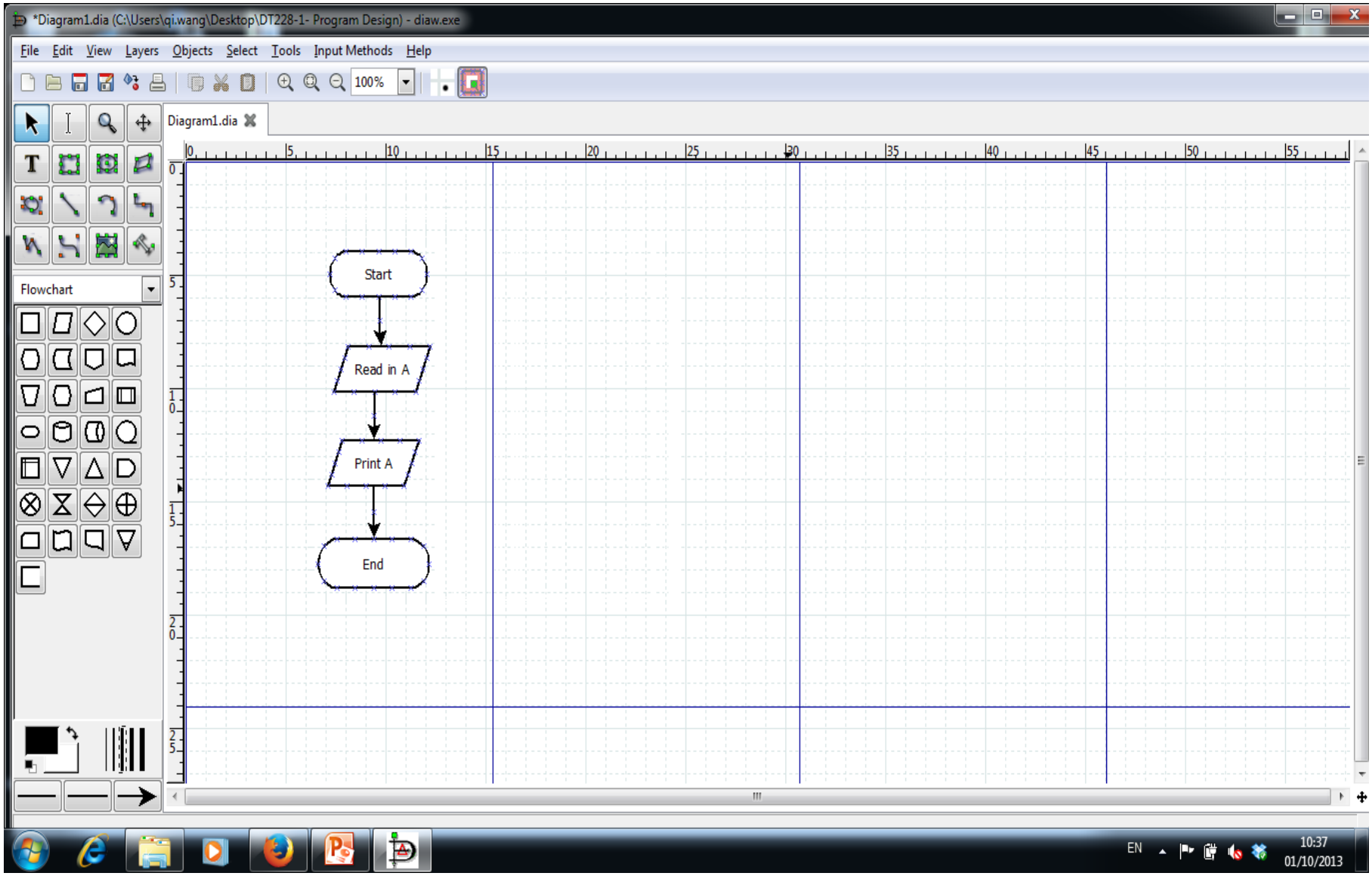
Download Dia and try using it; tell us what you think of it (visit the Contact page), including to report bugs if you find them. You can even read the Development page to find out how to contribute to the code.

https://live.gnome.org/Dia

http://dia-installer.de/download/index.html

http://dia-installer.de/download/index.html

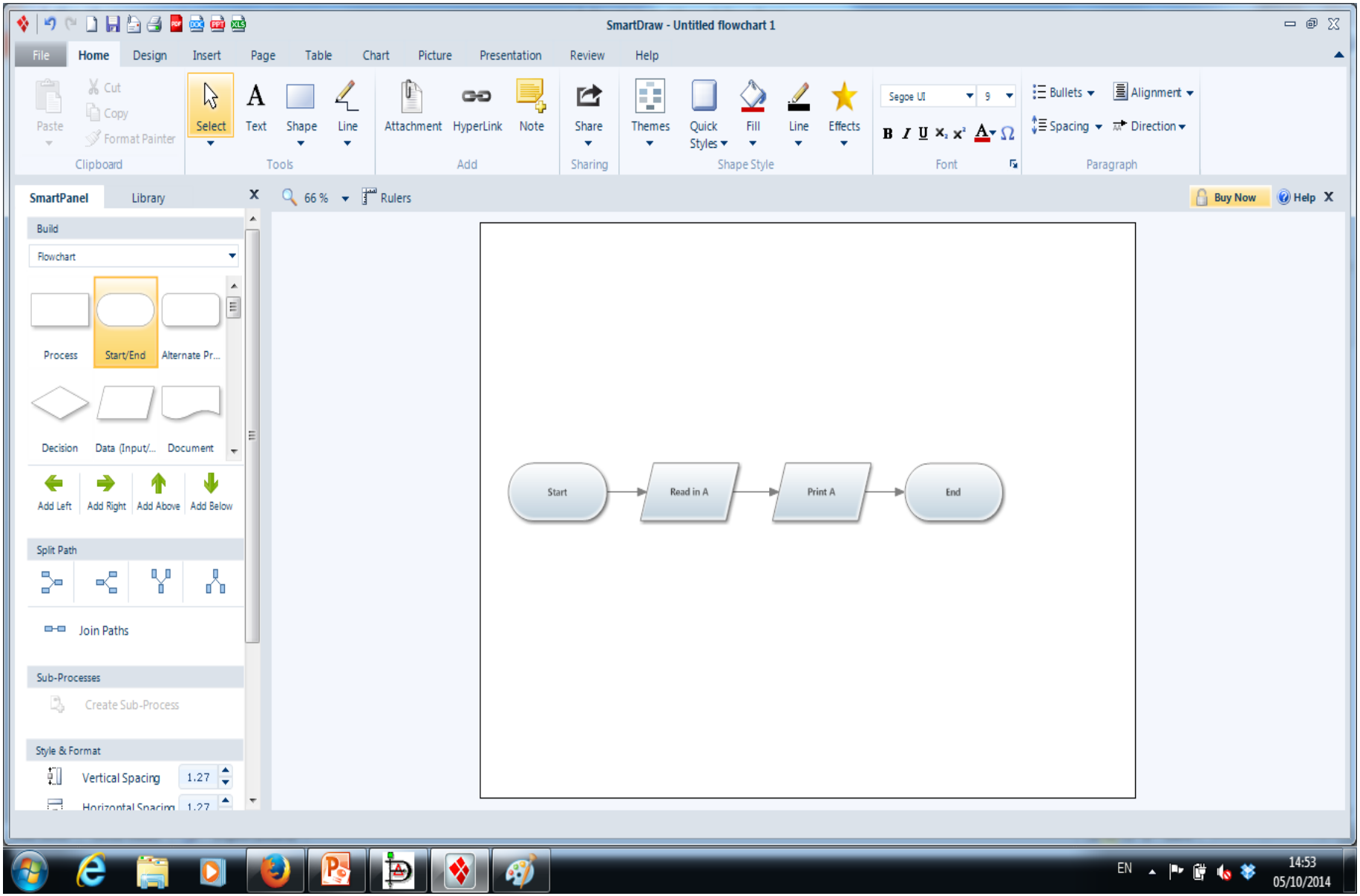
We use Dia Diagram Editor – an example



SmartDraw

http://www.smartdraw.com/

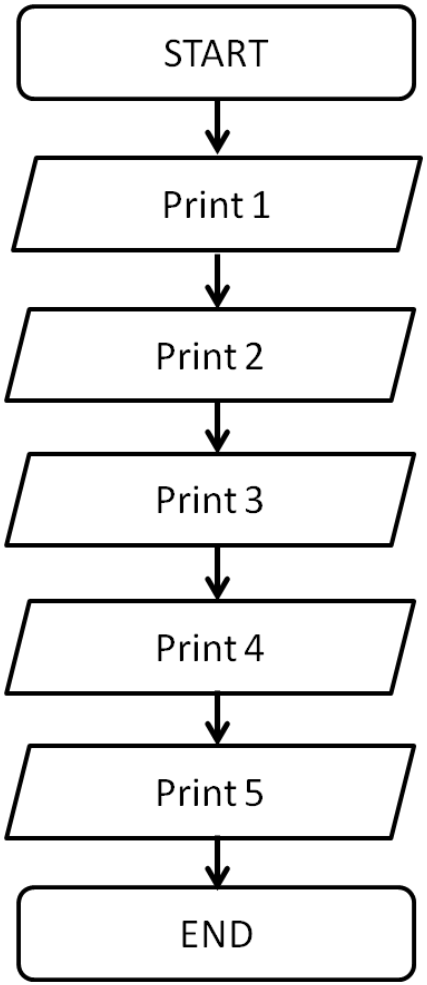
SmartDraw – an example

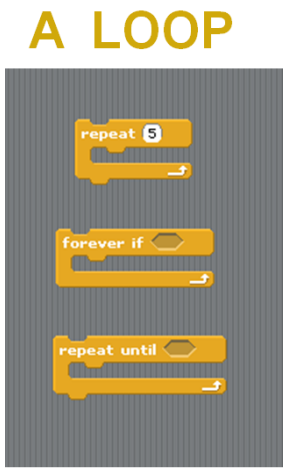


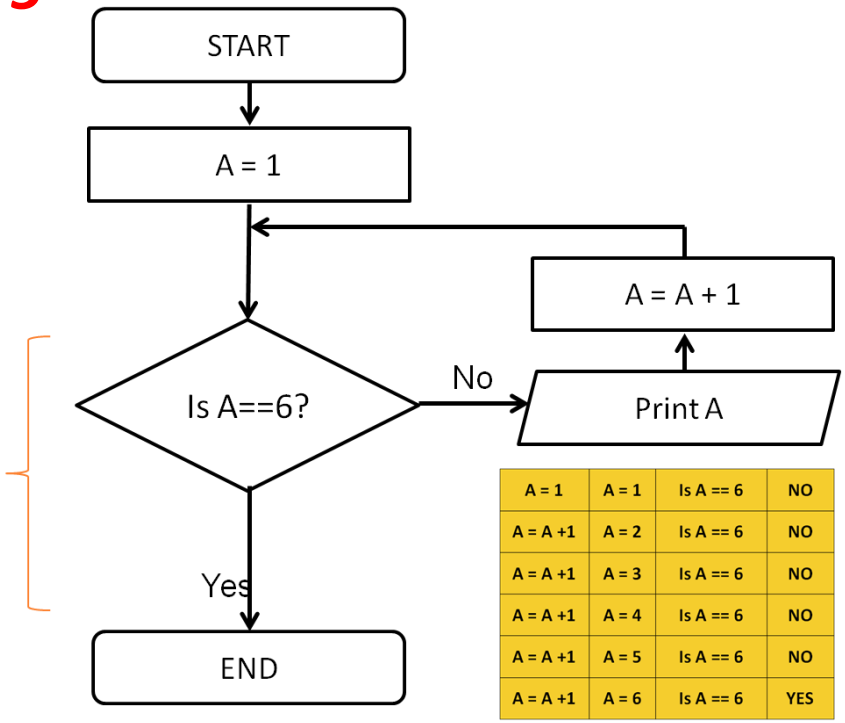
Flowcharts – print out 5 numbers (Problem 8)

- So let's say we want to express the following algorithm:

Print out the numbers from 1 to 5







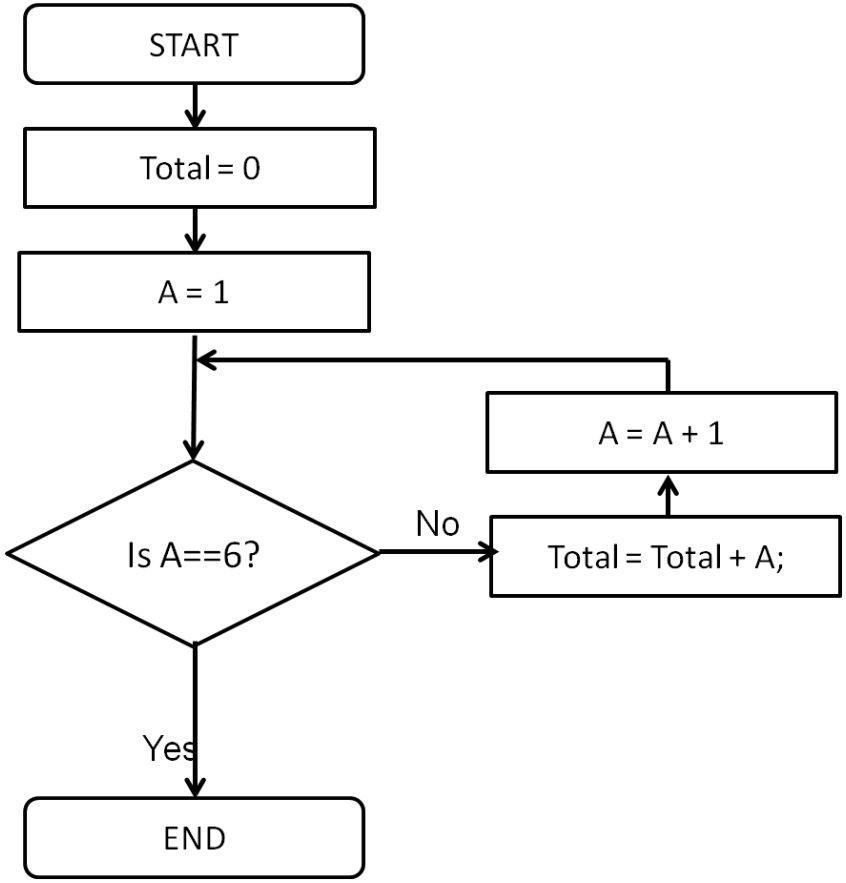
A = 1	A = 1	Is A == 6	NO
A = A +1	A = 2	Is A == 6	NO
A = A +1	A = 3	Is A == 6	NO
A = A +1	A = 4	Is A == 6	NO
A = A +1	A = 5	Is A == 6	NO
A = A +1	A = 6	Is A == 6	YES

Remember the river crossing chart. That is a format (model, approach) for checking your design – USE IT

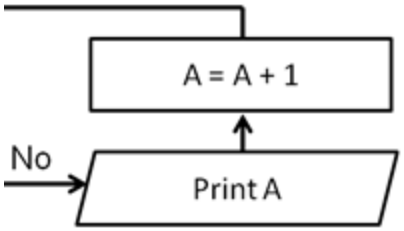
Flowcharts – add up numbers 1 to 5 (Problem 9)

- So let's say we want to express the following algorithm:

  Add up the numbers 1 to 5



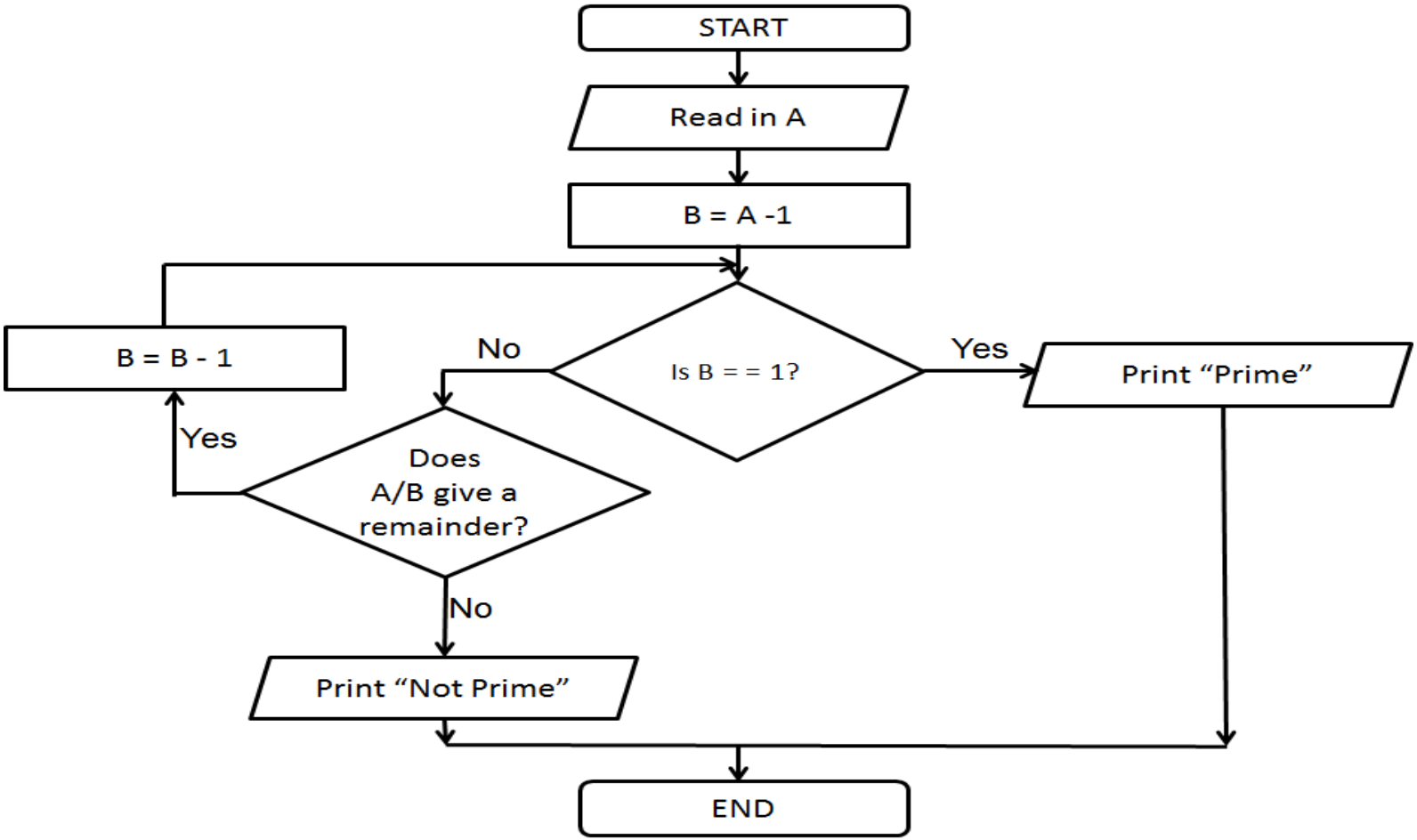
See the difference between problem 8 and this problem?



Flowcharts – check if a prime number (Problem 10)

- So let's say we want to express the following algorithm:

  Read in a number and check if it's a prime number.



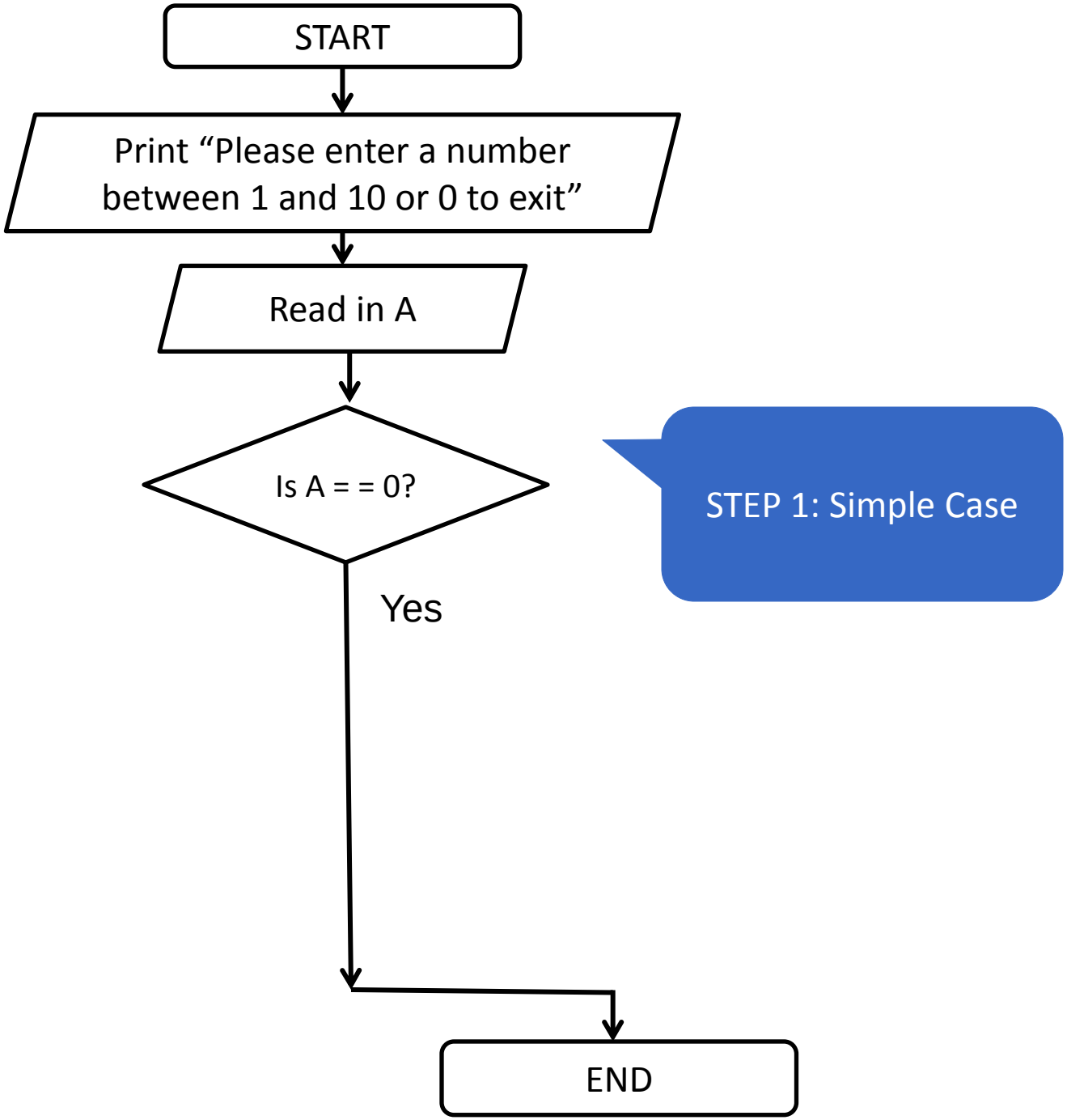
More examples on flowcharts

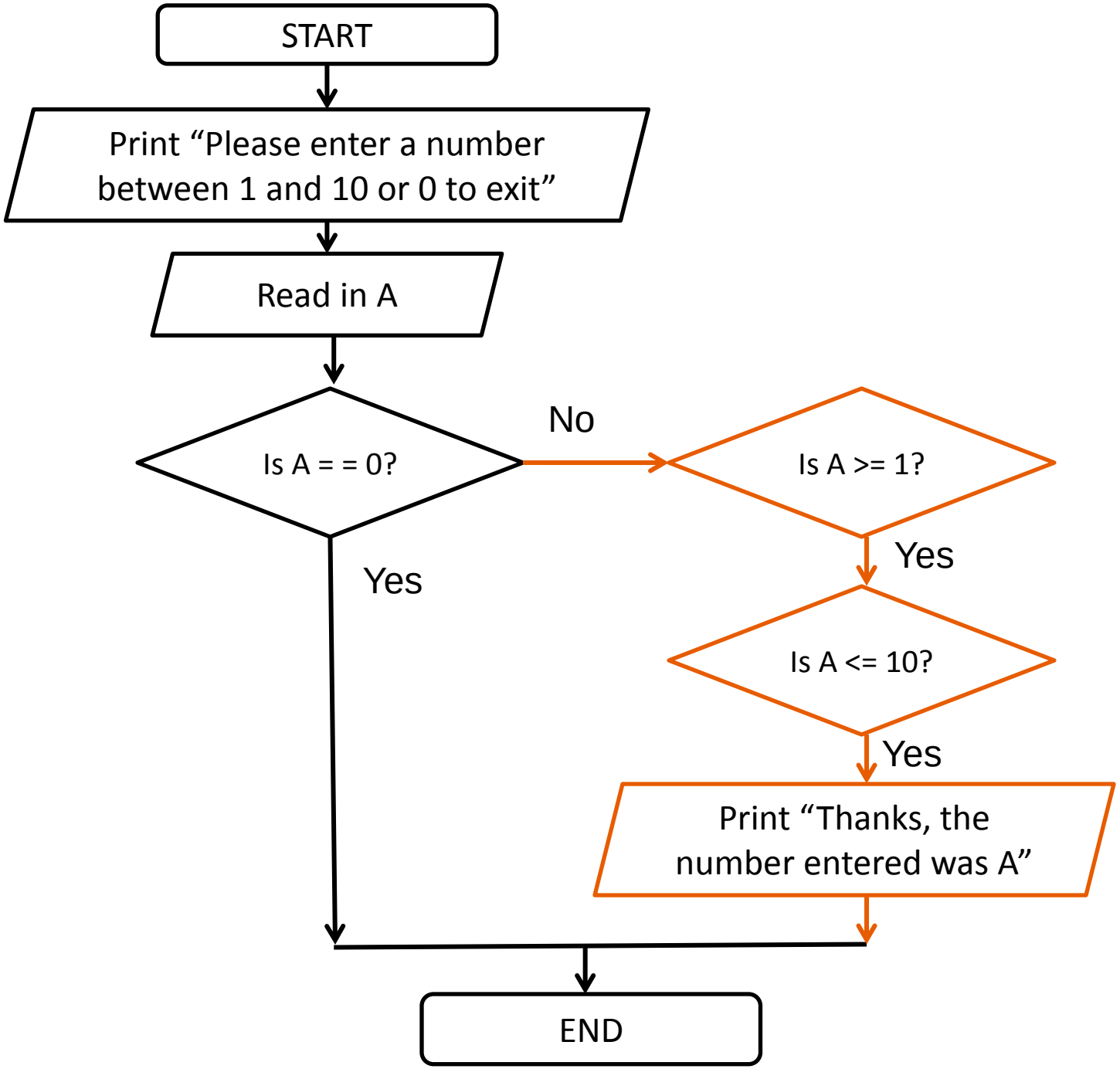
Flowcharts – Error Handling (Problem 11)

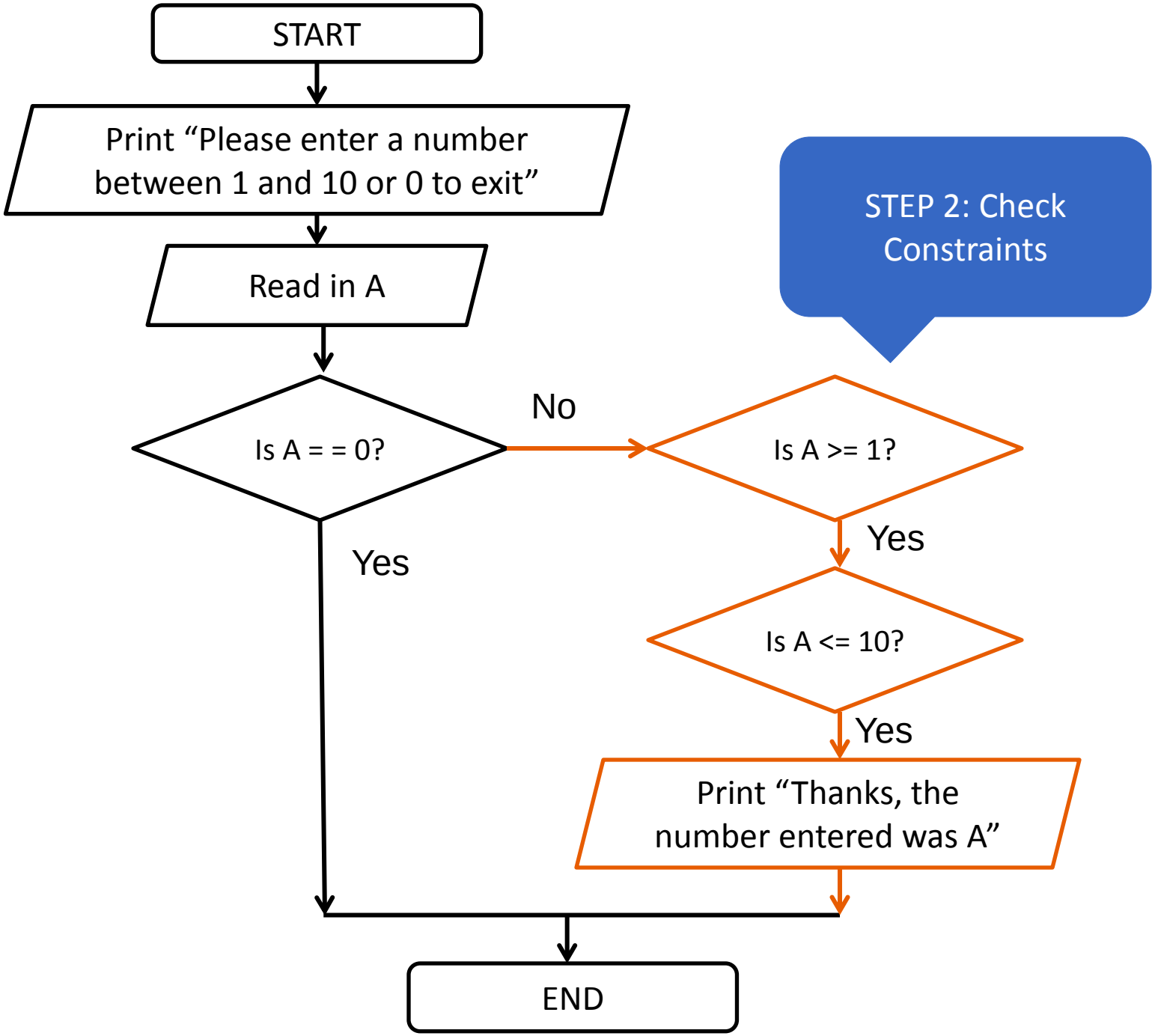
- Express the following:

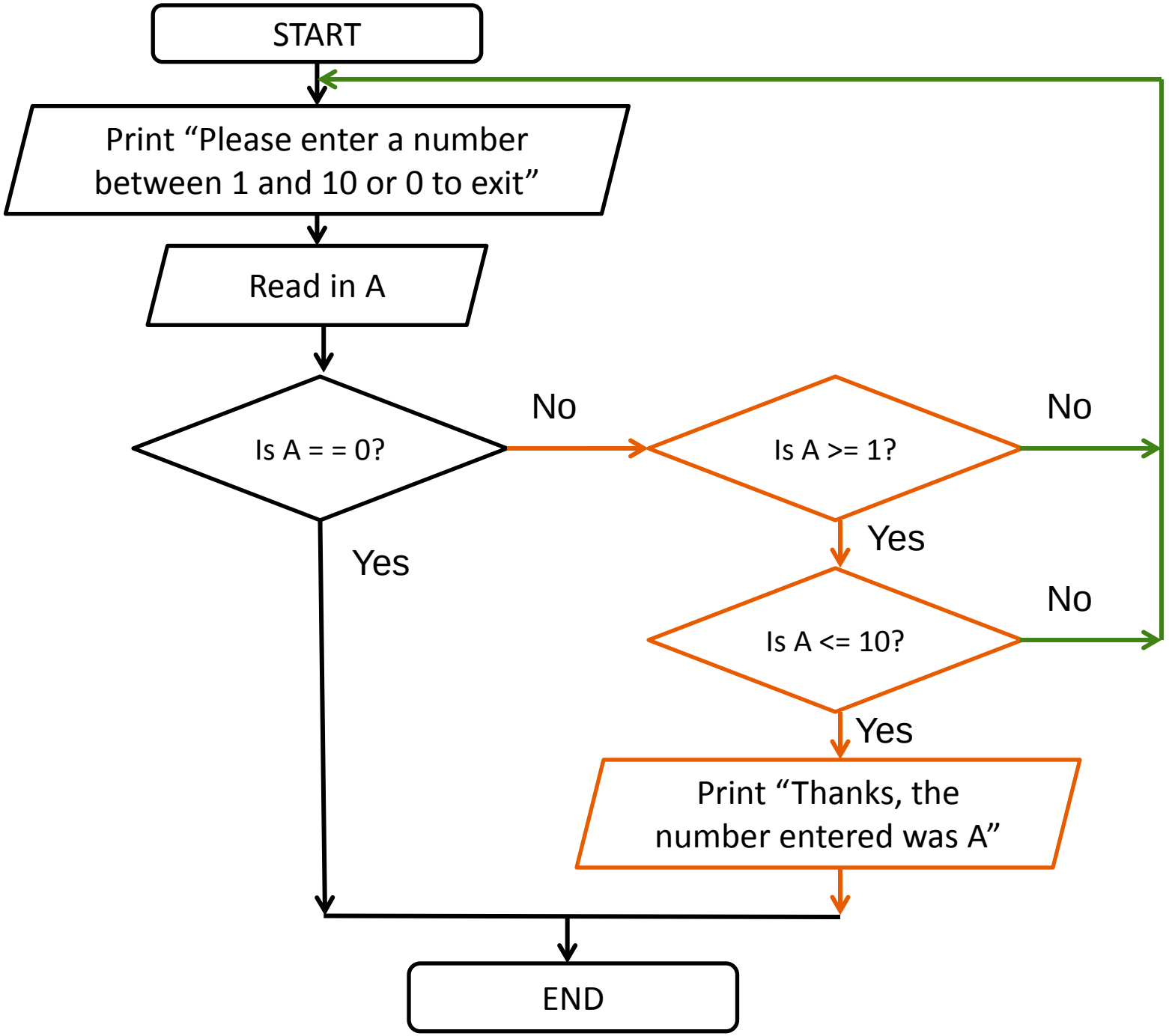
Read in a number, check if the number is between 1 and 10. If not ask again and keep asking. Exit if 0 entered.

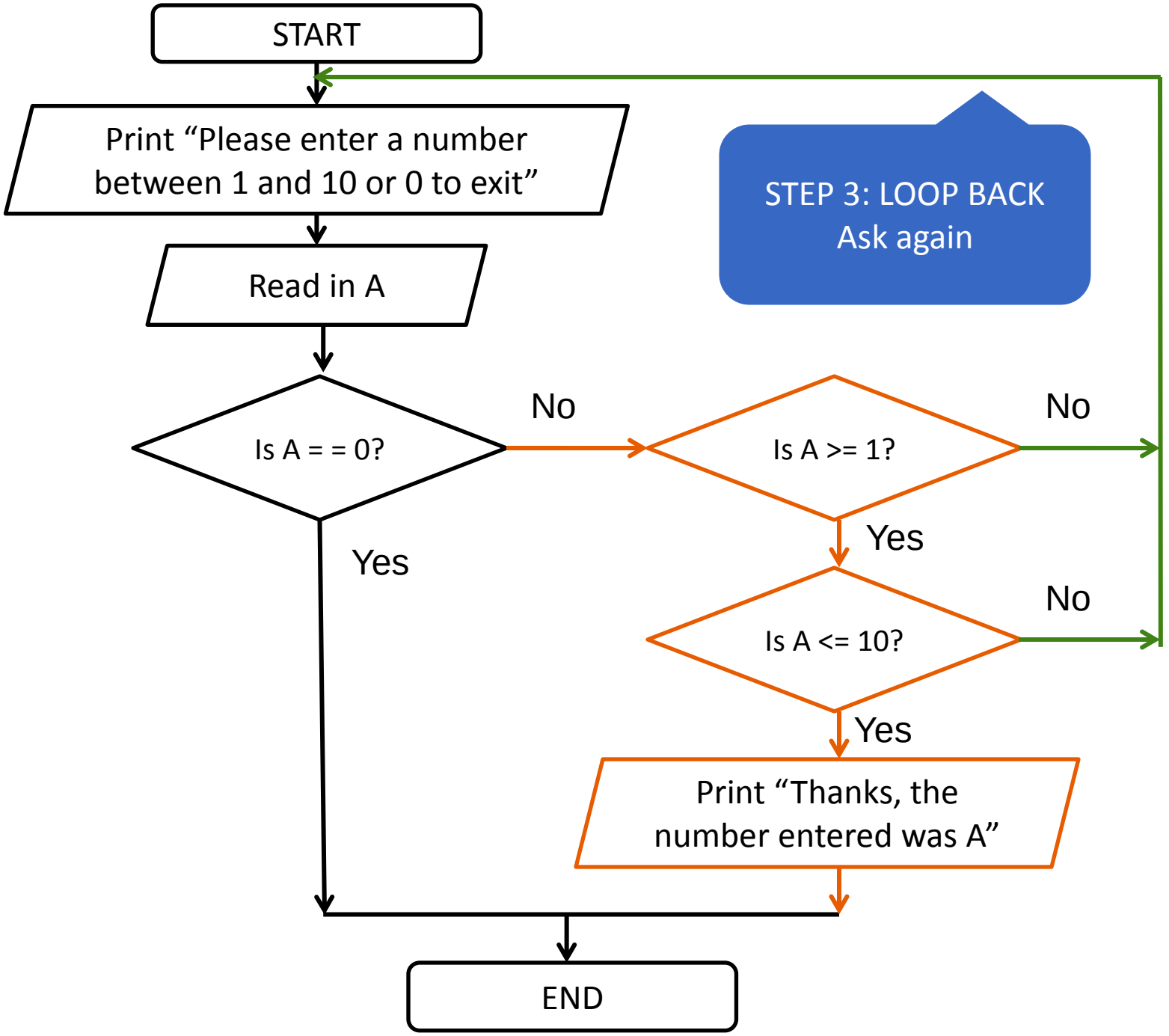
Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or ouptut.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.

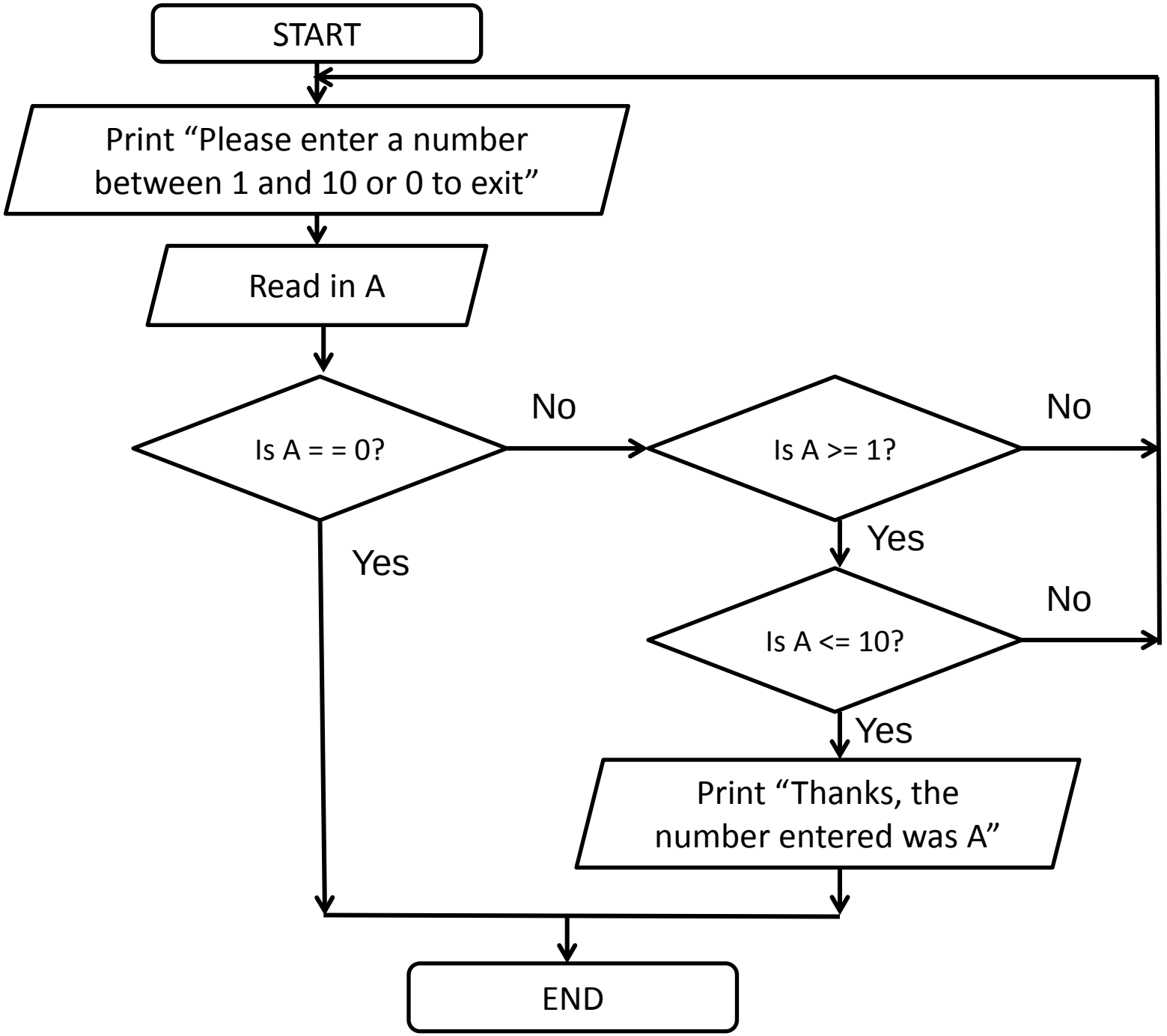

START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
Yes
END
STEP 1: Simple Case


START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
Yes
Is A <= 10?
Yes
Print “Thanks, the number entered was A”
END


START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
Yes
Is A <= 10?
Yes
Print “Thanks, the number entered was A”
END
STEP 2: Check Constraints


START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
No
Yes
Is A <= 10?
No
Yes
Print “Thanks, the number entered was A”
END


START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
No
Yes
Is A <= 10?
No
Yes
Print “Thanks, the number entered was A”
END
STEP 3: LOOP BACK
Ask again

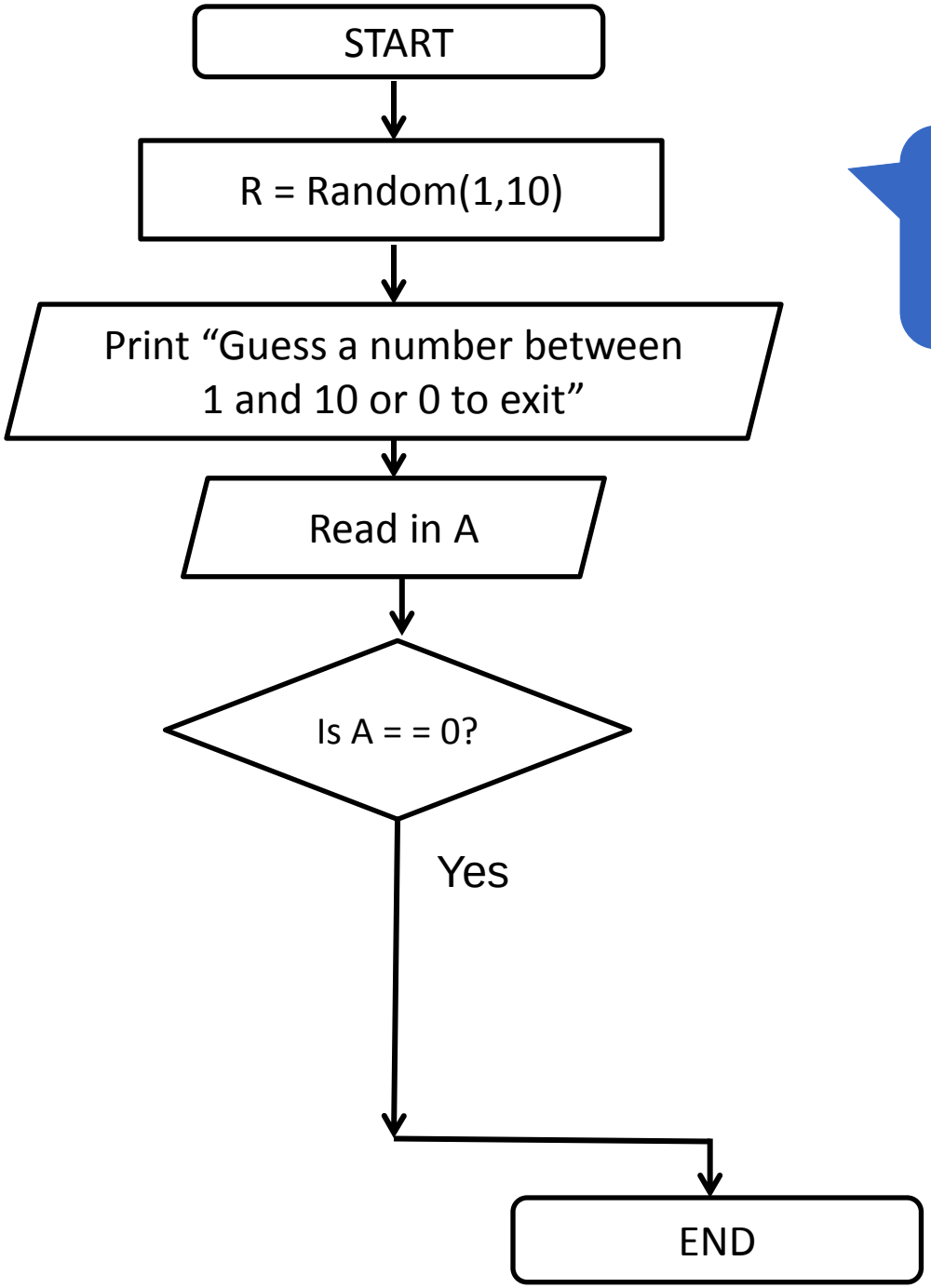

START
Print “Please enter a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Is A >= 1?
No
Yes
Yes
Is A <= 10?
No
Yes
Print “Thanks, the number entered was A”
END

Flowcharts – Error Handling (Problem 12)

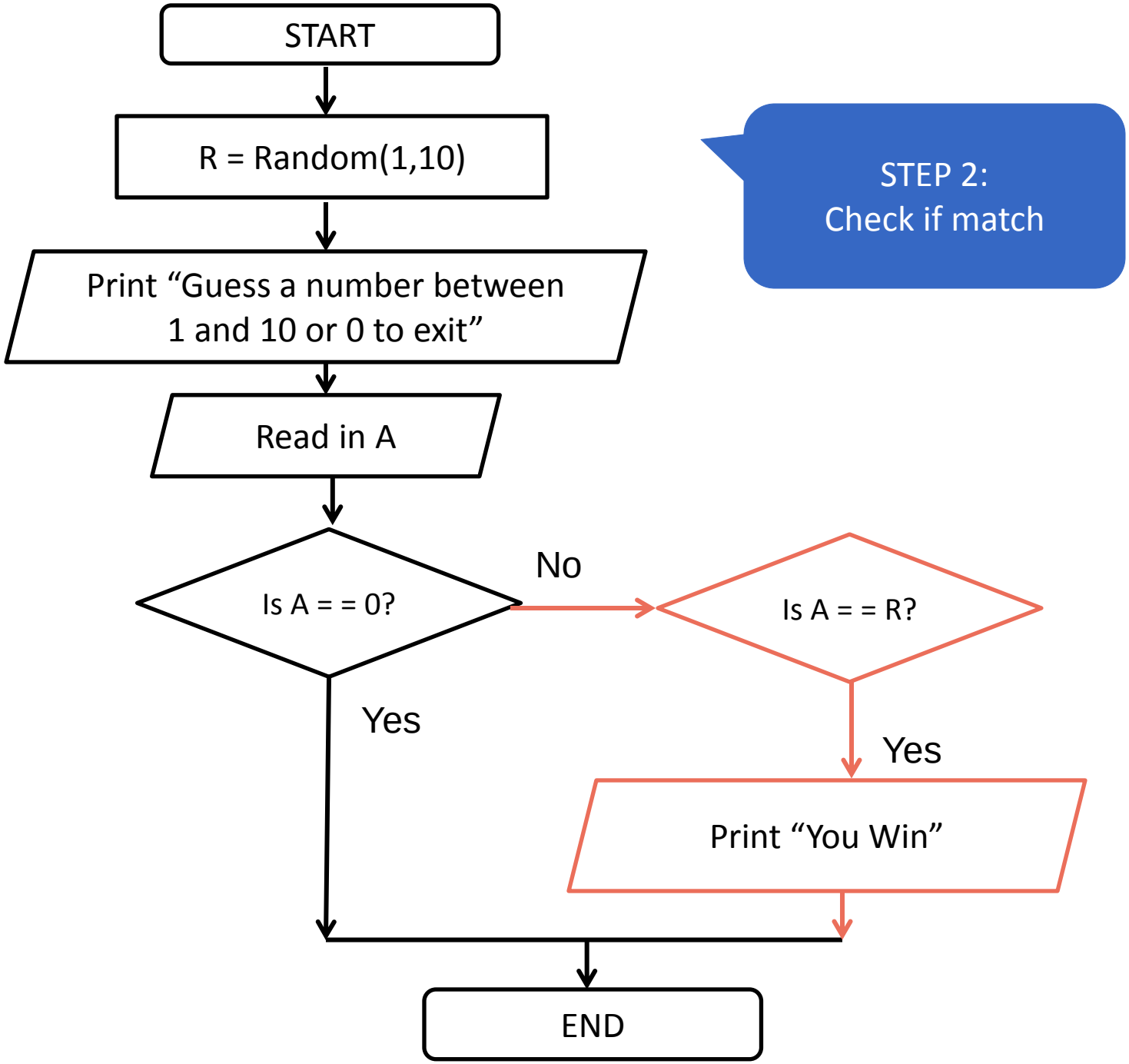
- Express the following:

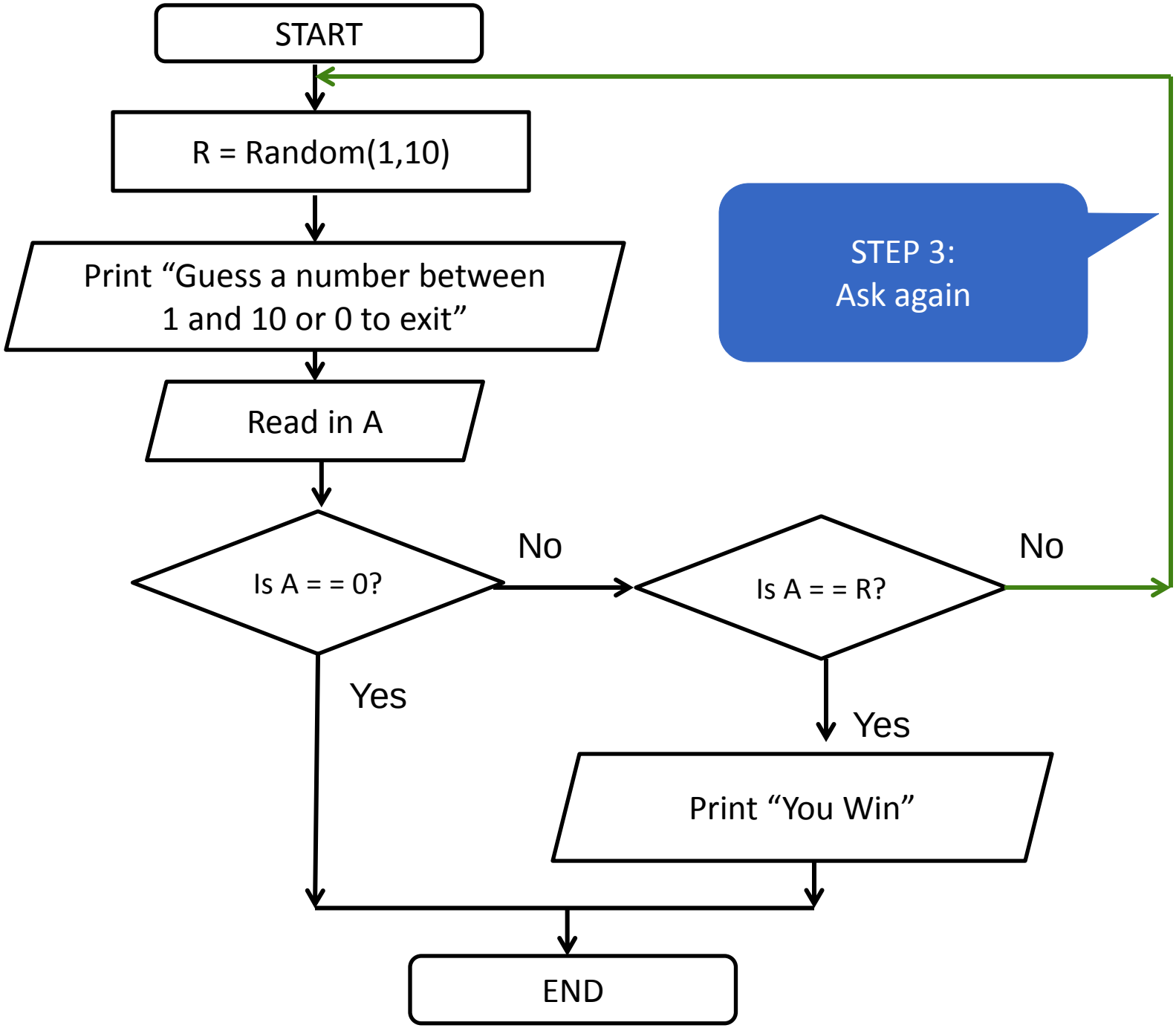
Generate a random number between 1 and 10, ask the user to guess the number or enter 0 to exit.

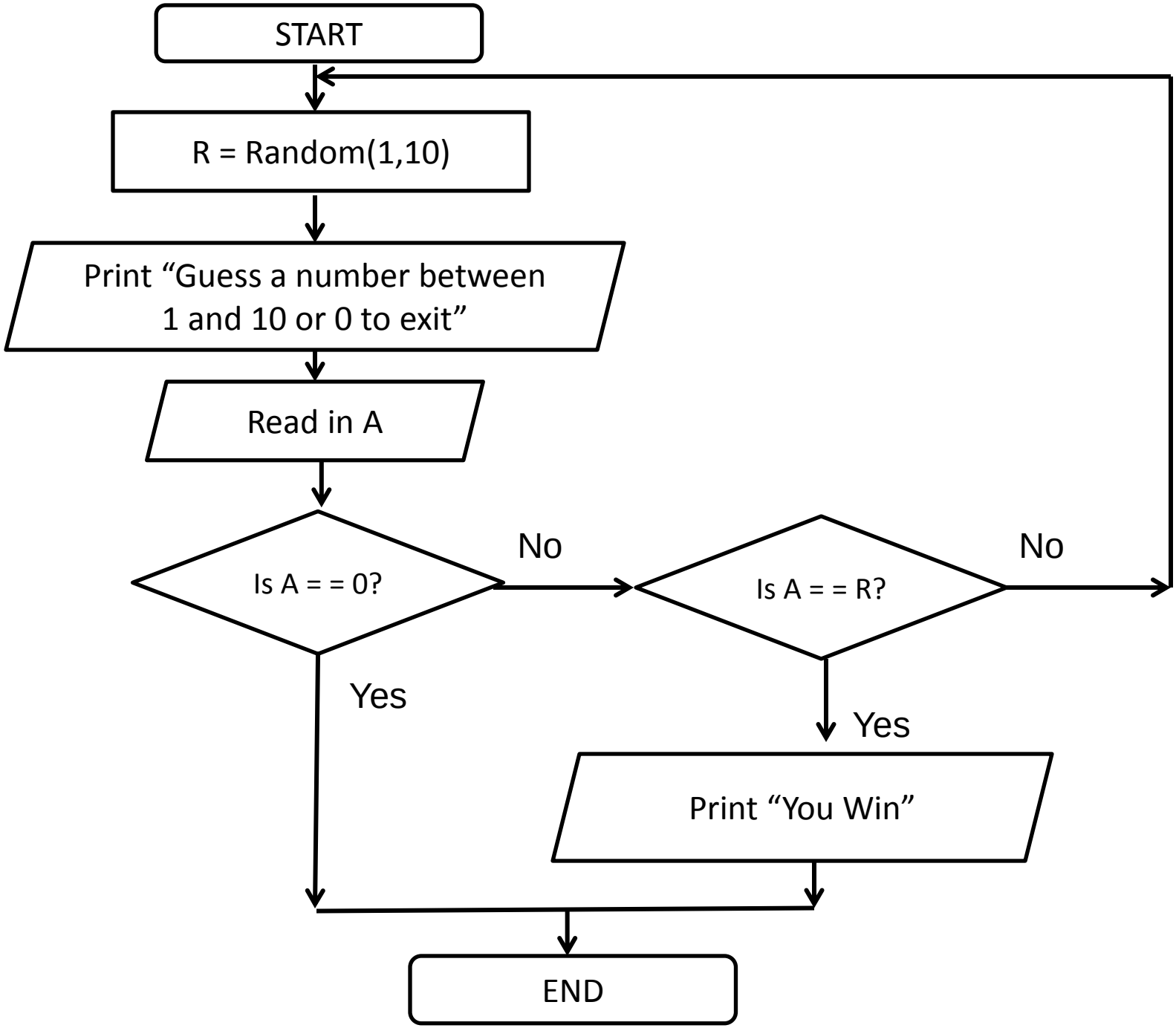
Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or ouptut.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.

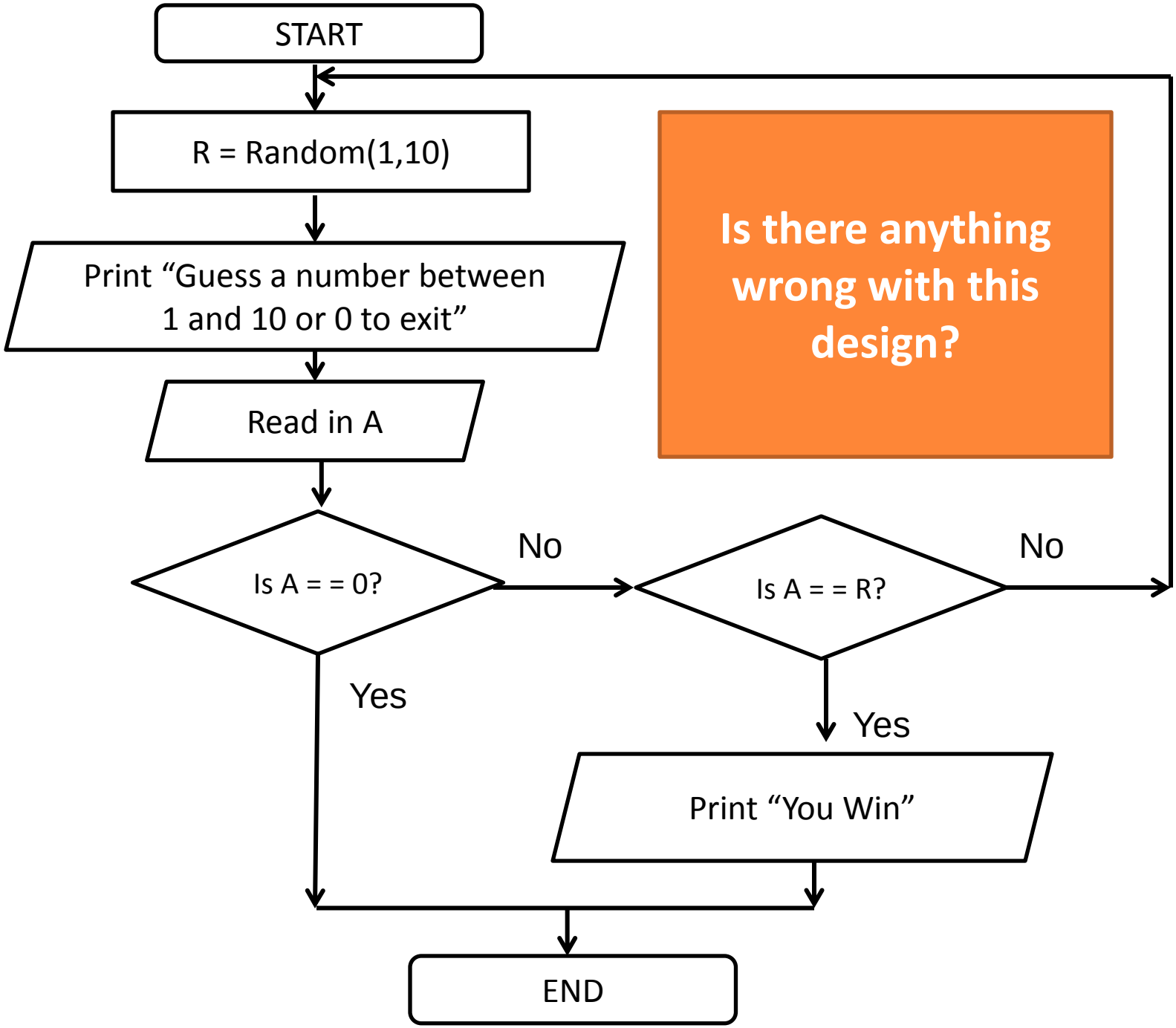


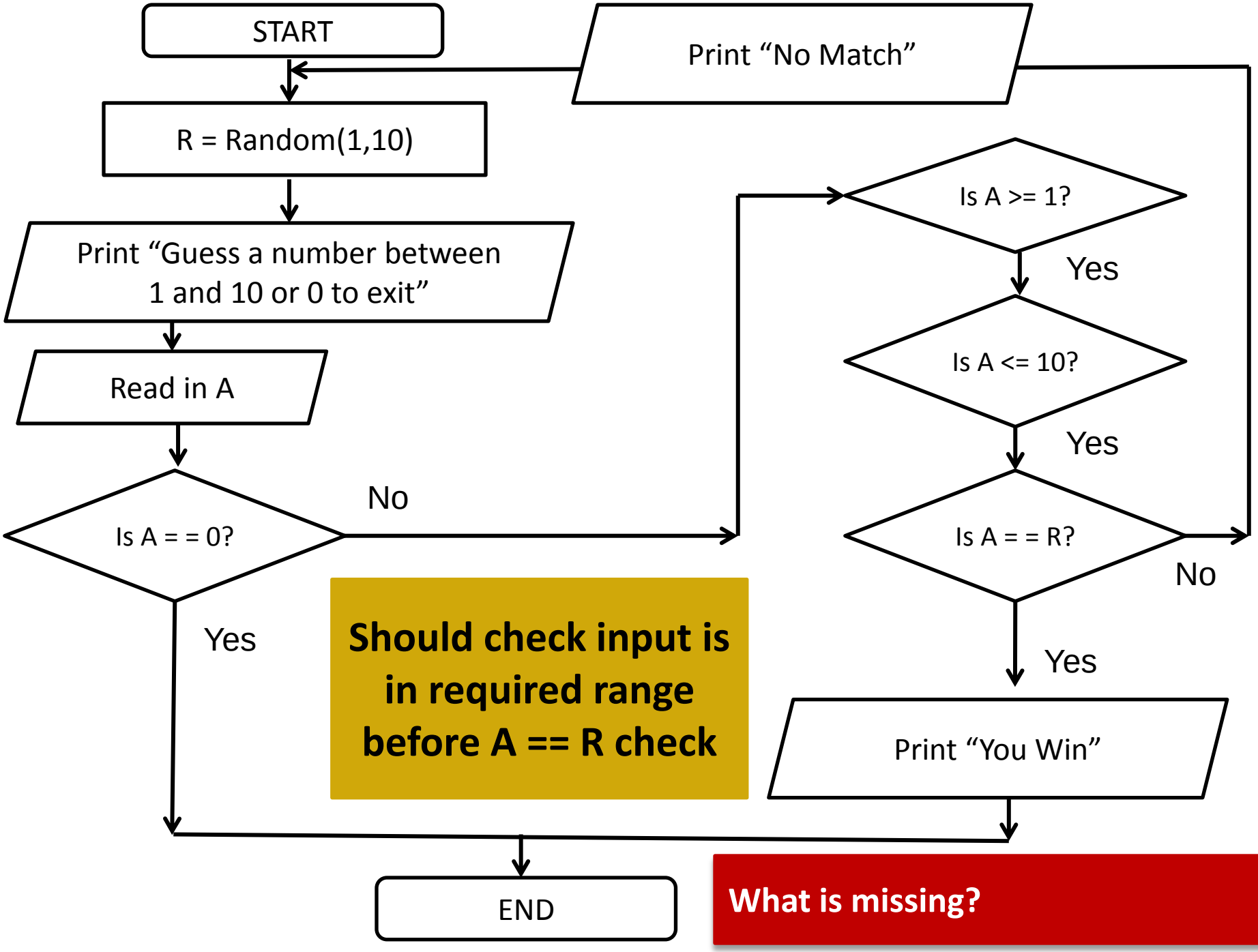
STEP 1: Simple case


START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Is A = = R?
Yes
Yes
Print “You Win”
END
STEP 2:
Check if match


START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Is A = = R?
No
Yes
Yes
Print “You Win”
END
STEP 3:
Ask again


START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Is A = = R?
No
Yes
Yes
Print “You Win”
END


START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Is A = = R?
No
Yes
Yes
Print “You Win”
END
Is there anything wrong with this design?

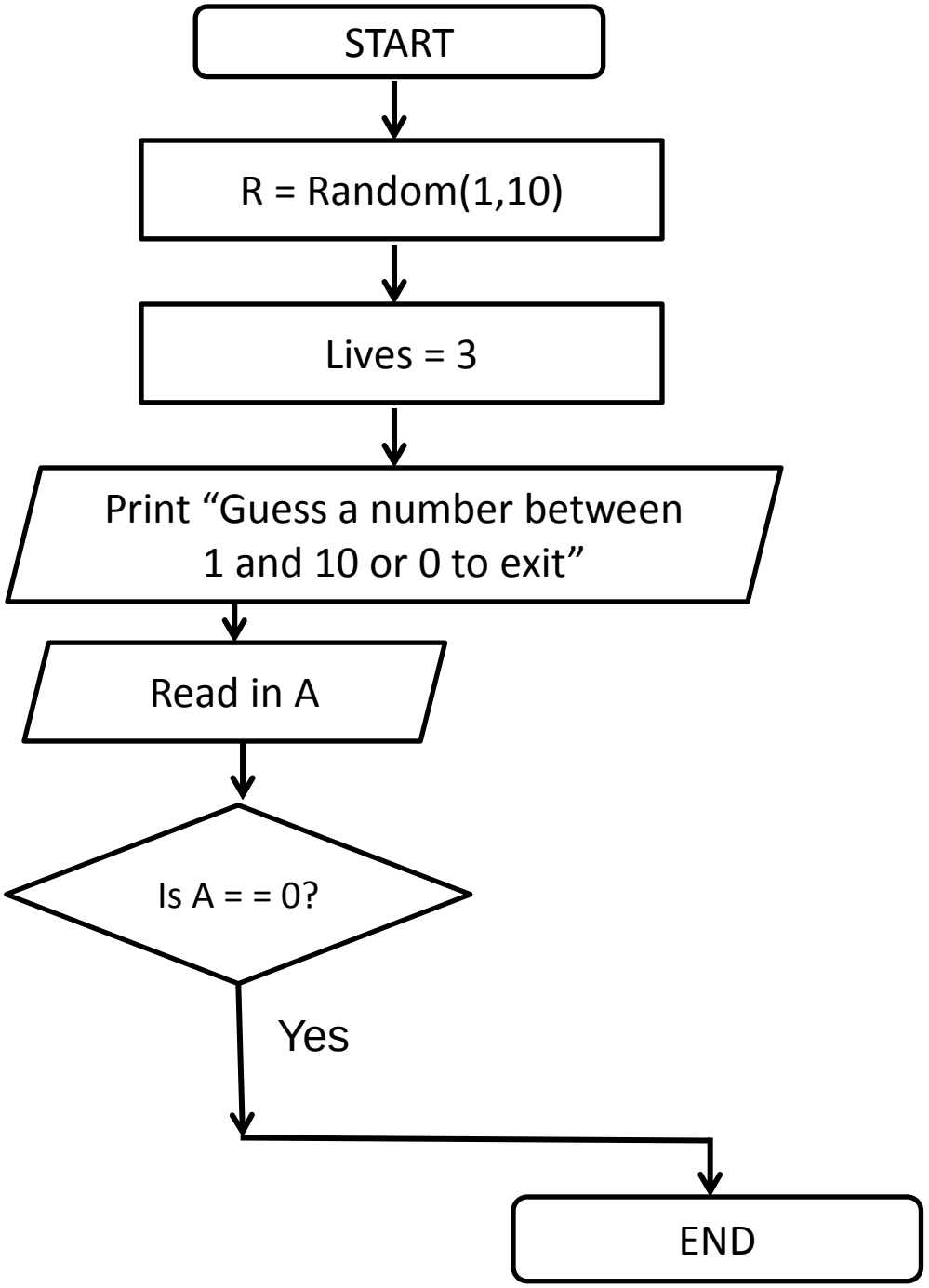

START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
No
Yes
Print “No Match”
Print “You Win”
END
Should check input is in required range before A == R check
What is missing?

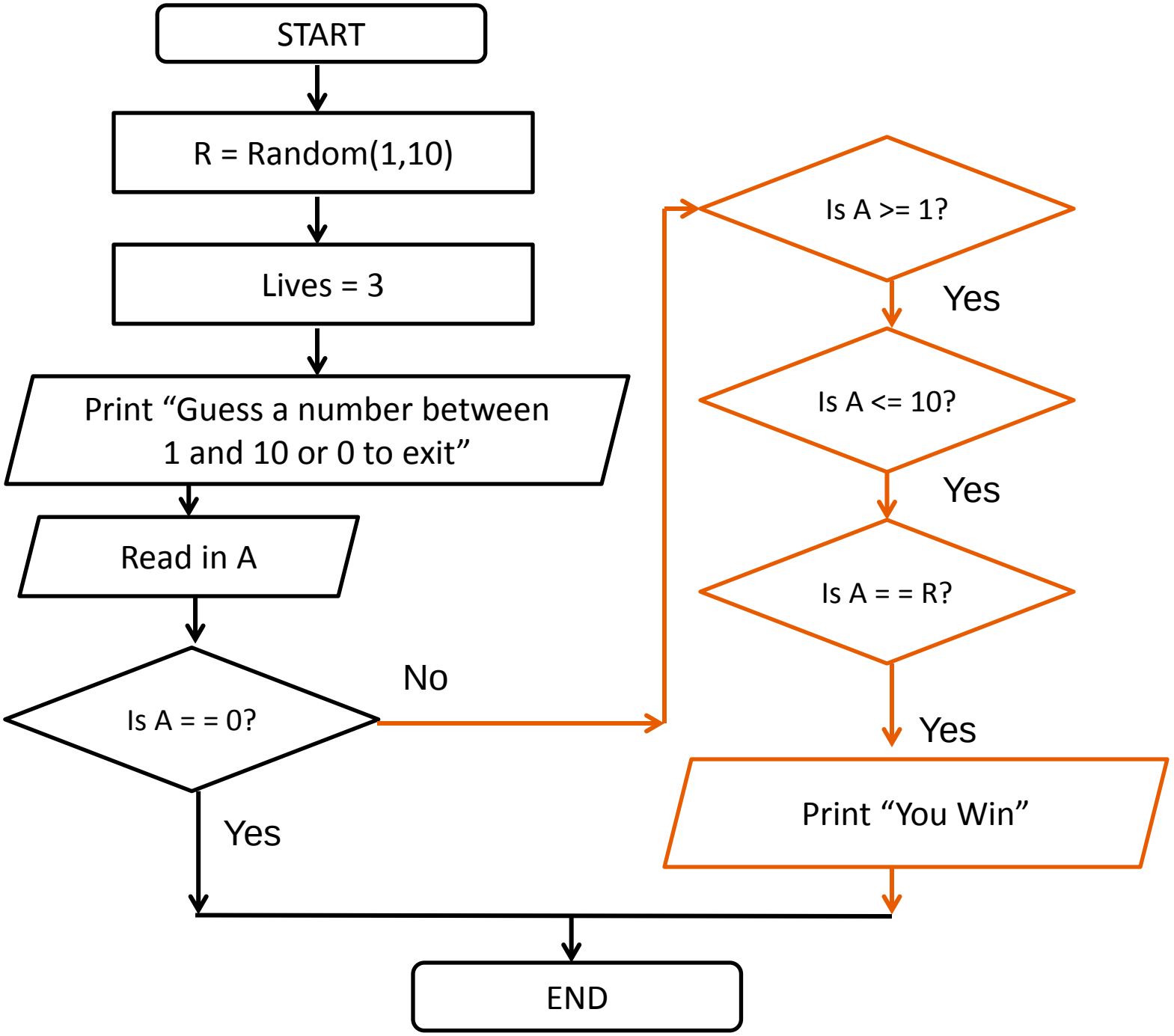
Flowcharts – Guessing (Problem 13)

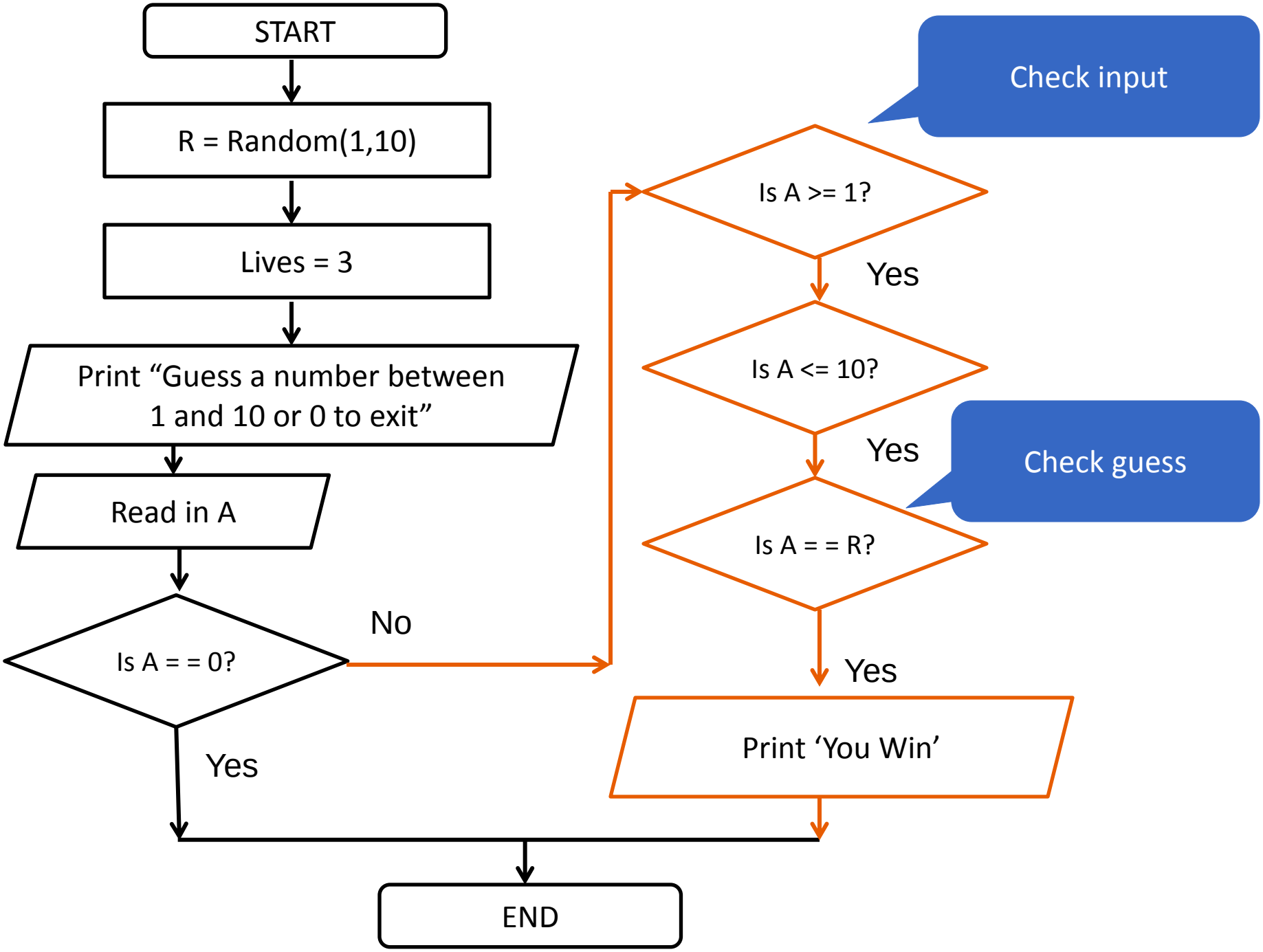
- Express the following:

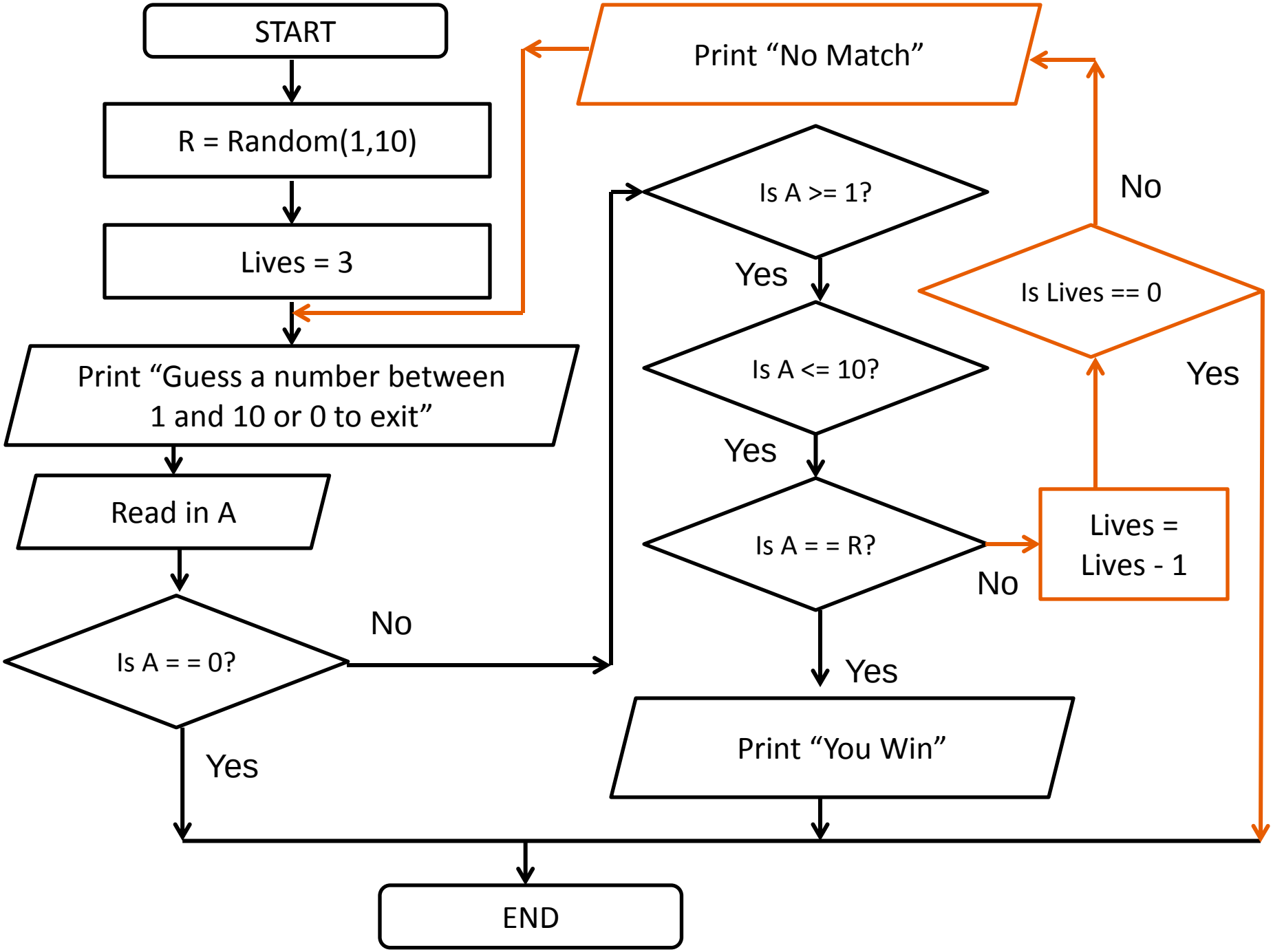
Generate a random number between 1 and 10, ask the user to guess the number or enter 0 to exit. ***Let the user have three chances to guess the number.***

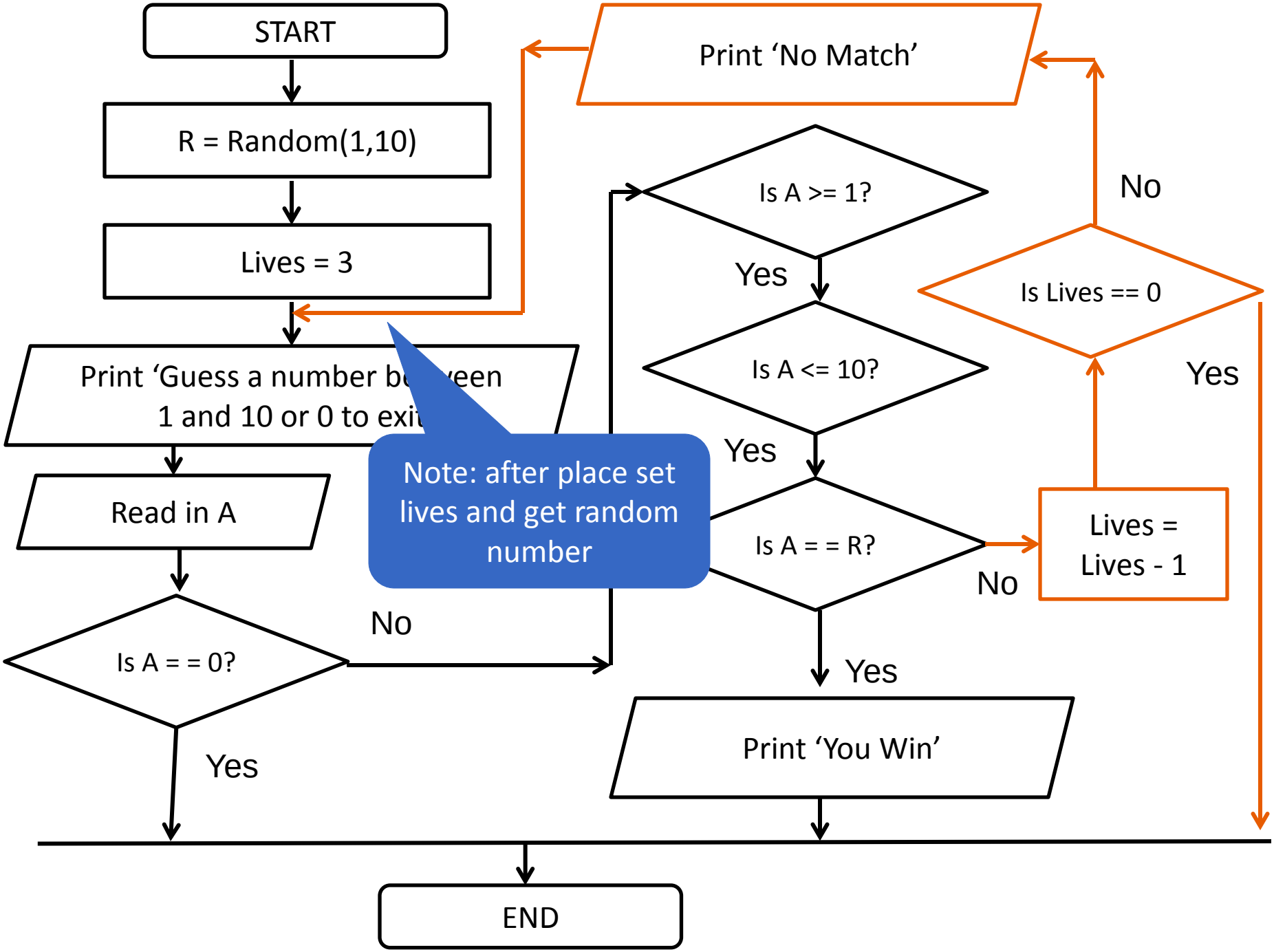
Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or ouptut.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.

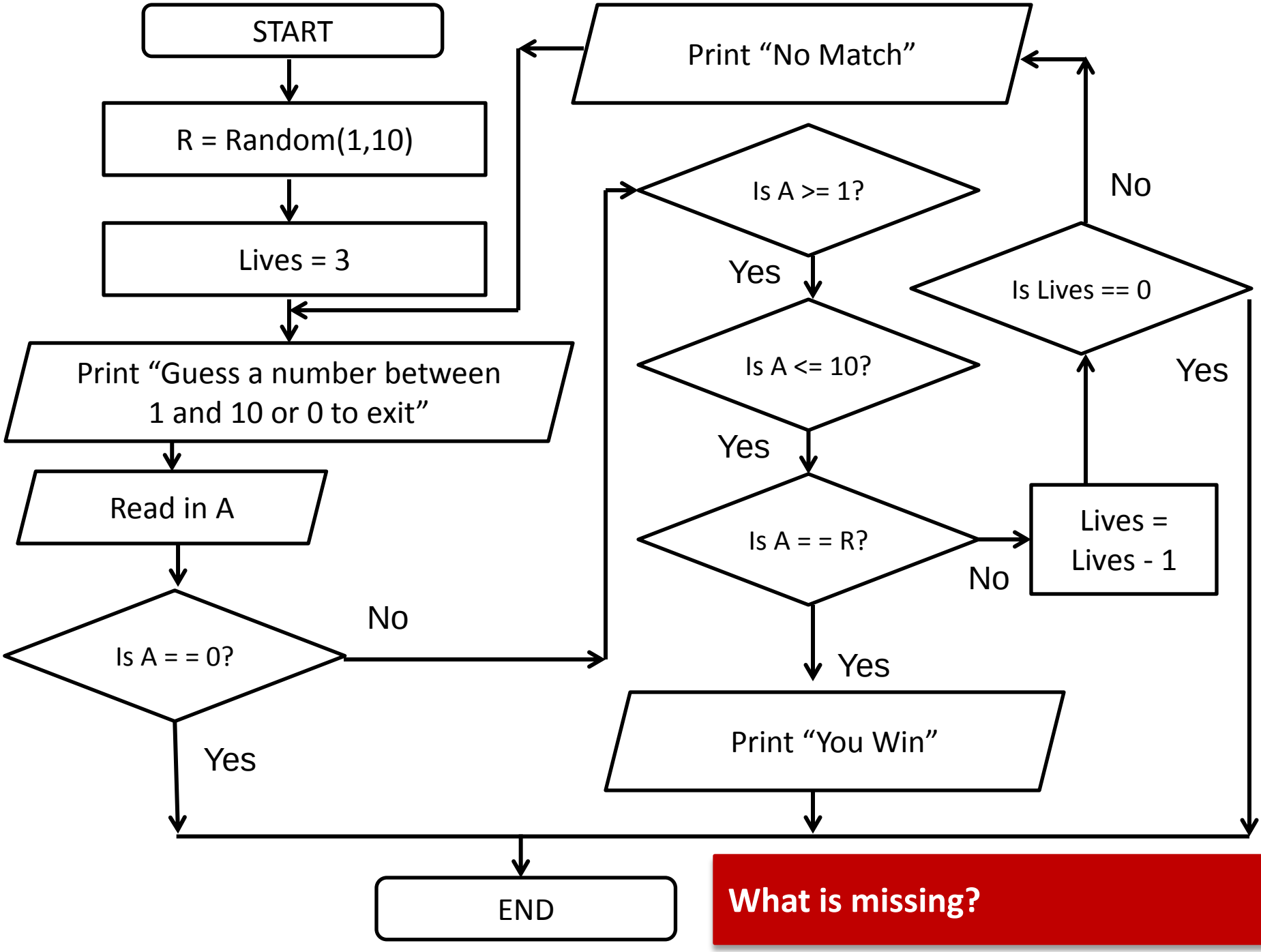

START
R = Random(1,10)
Lives = 3
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
Yes
END


START
R = Random(1,10)
Lives = 3
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
Yes
Print “You Win”
END


START
R = Random(1,10)
Lives = 3
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
Yes
No
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
Yes
Print ‘You Win’
END
Check input
Check guess


START
R = Random(1,10)
Lives = 3
Print "Guess a number between 1 and 10 or 0 to exit"
Read in A
Is A = = 0?
No
Yes
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
No
Lives = Lives - 1
Is Lives == 0
No
Yes
Print "No Match"
Yes
Print "You Win"
END


START
R = Random(1,10)
Lives = 3
Print 'Guess a number between 1 and 10 or 0 to exit'
Read in A
Is A = = 0?
Yes
No
Note: after place set lives and get random number
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
No
Lives = Lives - 1
Is Lives == 0
No
Yes
Print 'No Match'
Yes
Print 'You Win'
END



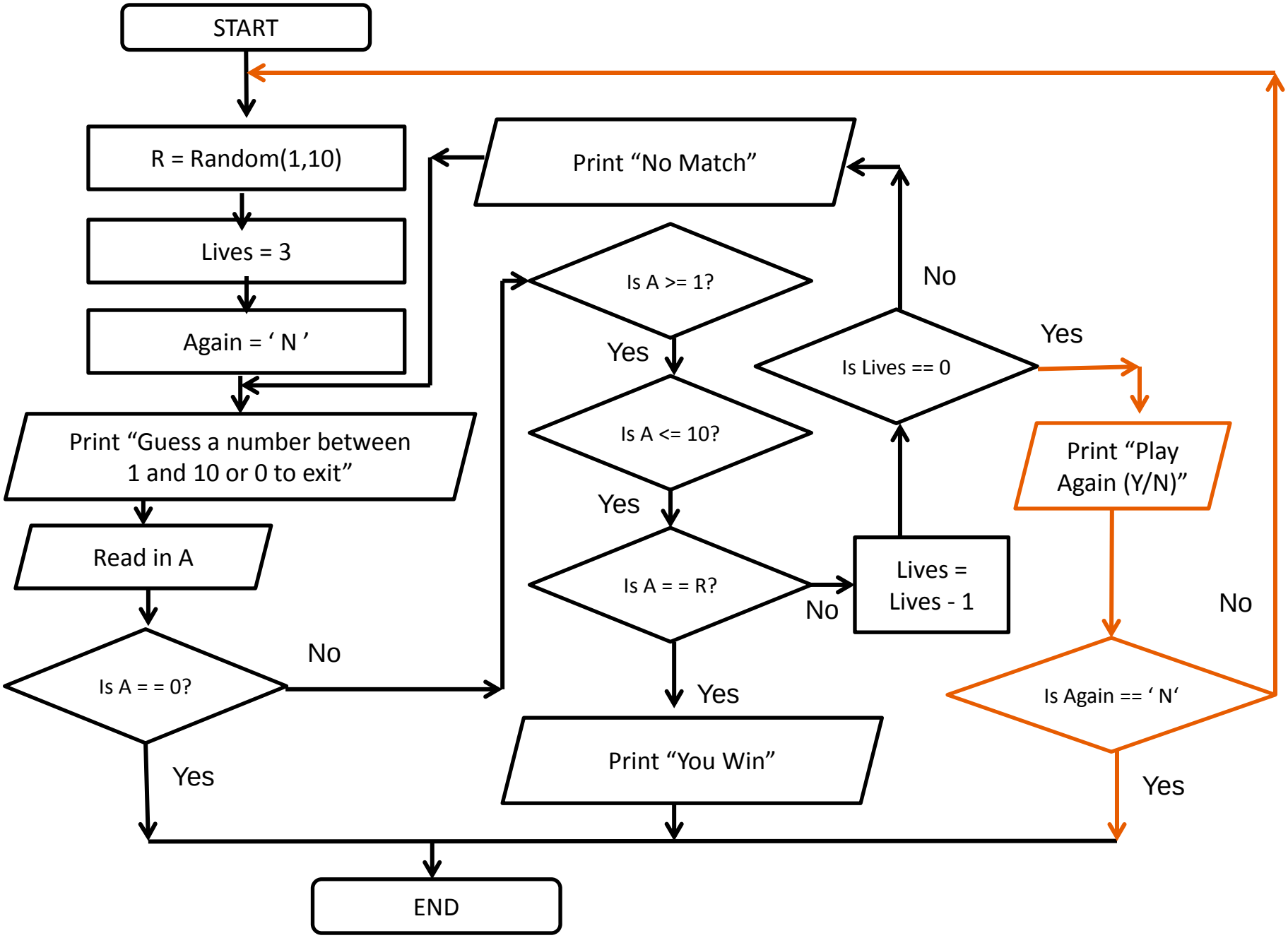
What is missing?

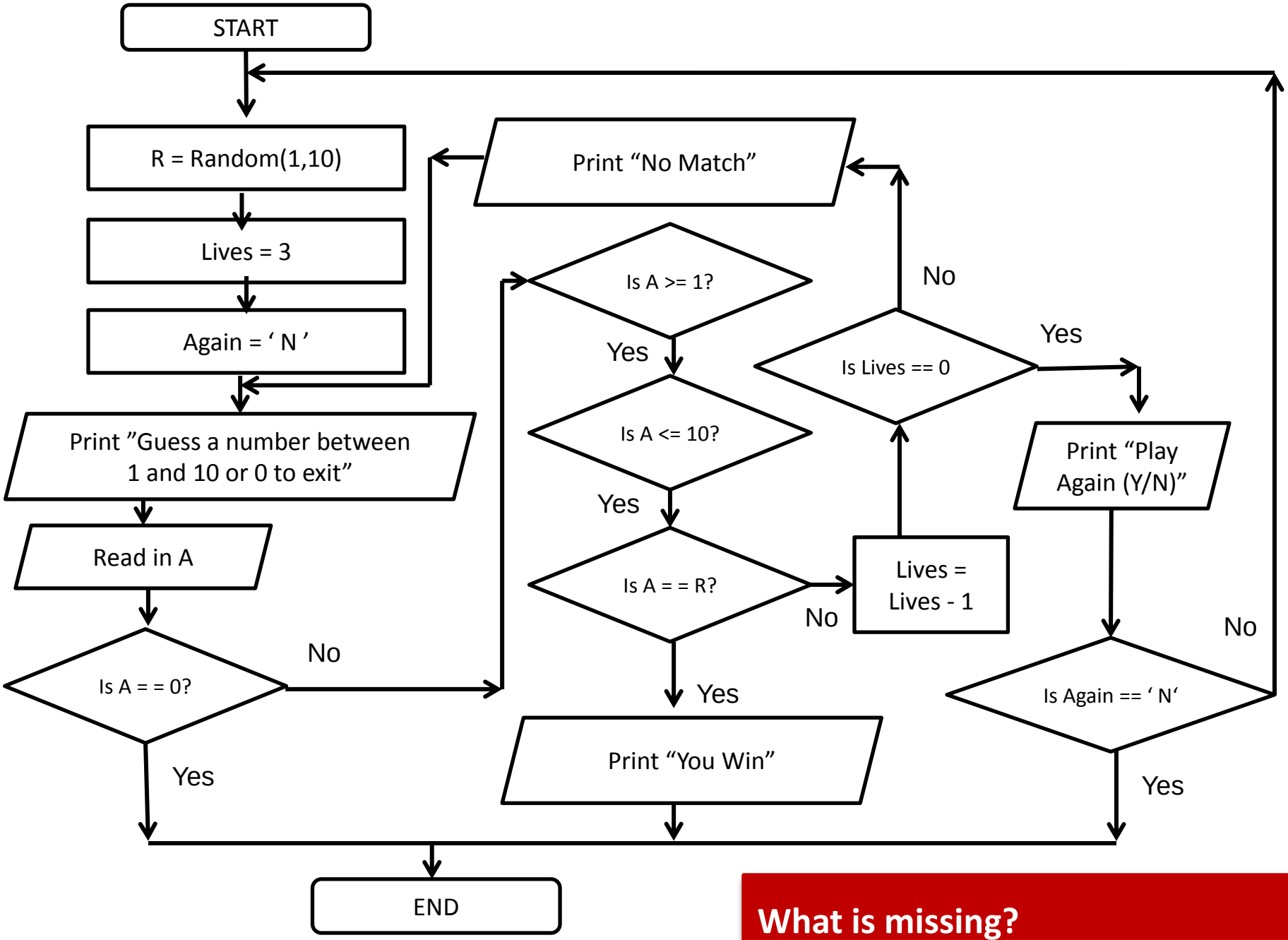
Flowcharts – Guessing (Problem 14)

- Express the following:

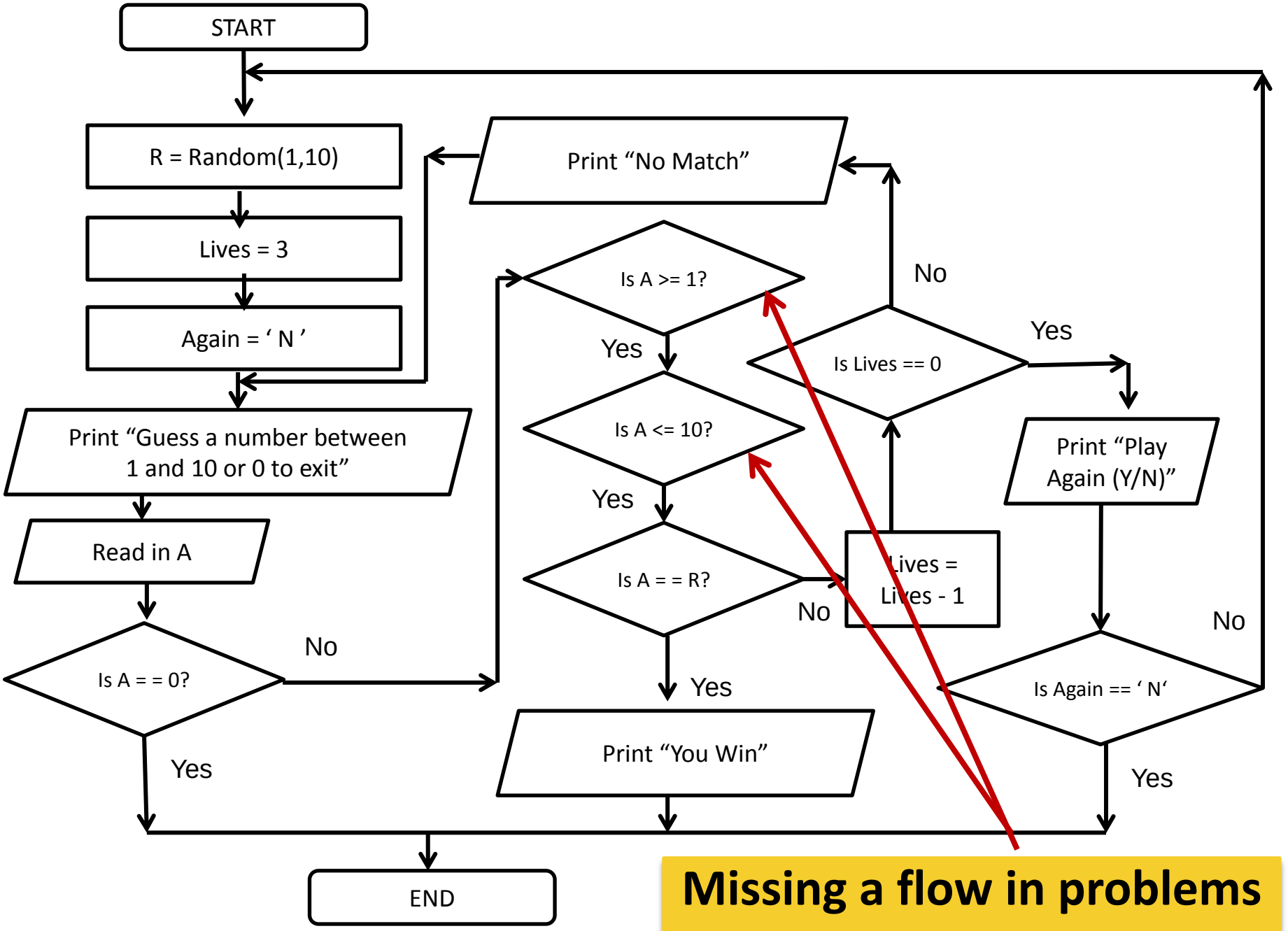
Generate a random number between 1 and 10, ask the user to guess the number or enter 0 to exit. Let the user have three chances to guess the number. ***After 3 chances ask if the user wants to play again rather than just exit.***

Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or ouptut.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.


START
R = Random(1,10)
Lives = 3
Again = ' N '
Print "Guess a number between 1 and 10 or 0 to exit"
Read in A
Is A = = 0?
No
Yes
END
Is A >= 1?
Yes
Is A <= 10?
Yes
Is A = = R?
No
Lives = Lives - 1
Yes
Print "You Win"
Print "No Match"
No
Is Lives == 0
Yes
Print "Play Again (Y/N)"
No
Is Again == ' N'
Yes



What is missing?

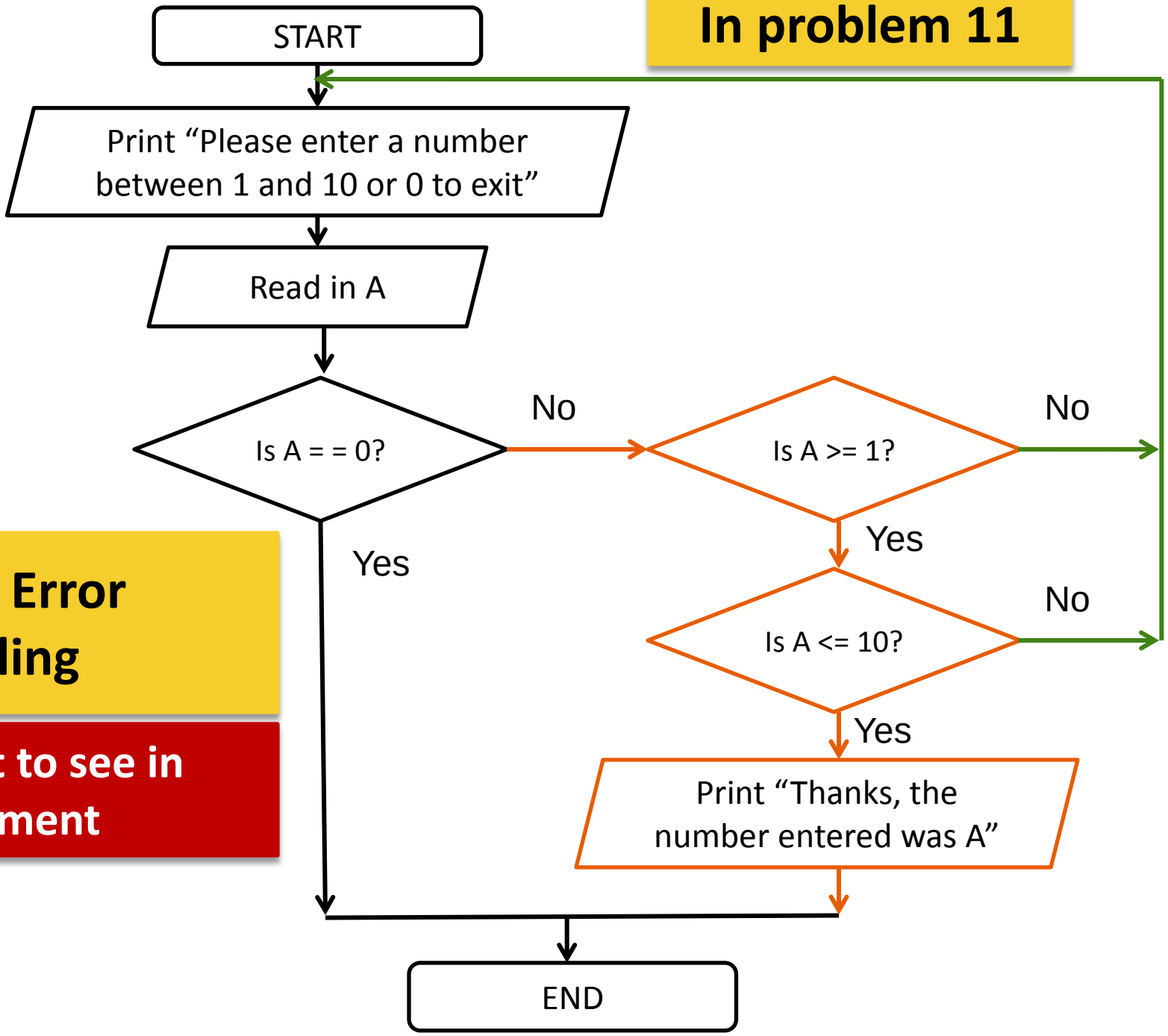


Missing a flow in problems 12, 13, and 14

Program Design

ERRORS AND CONNECTORS

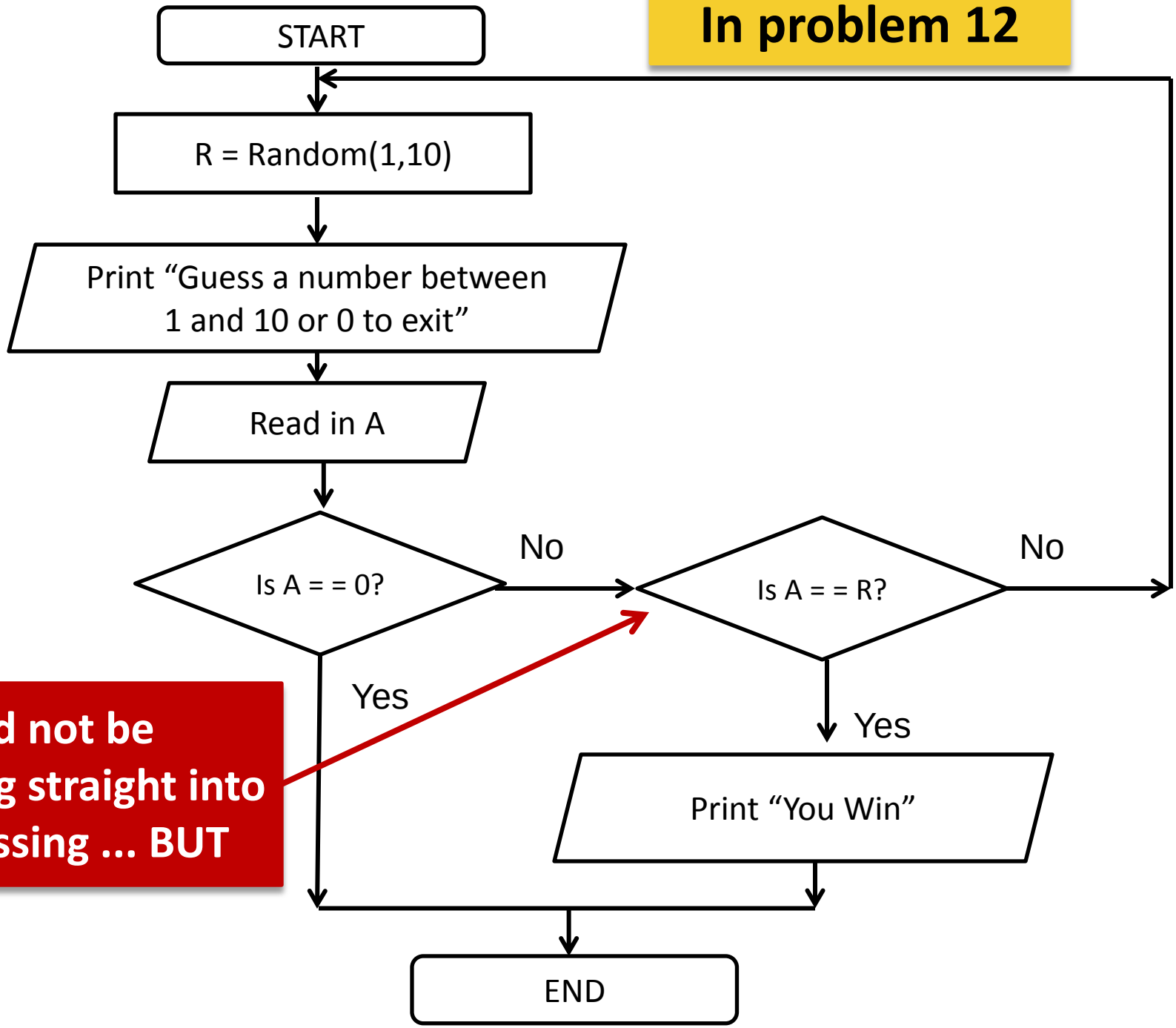
In problem 11



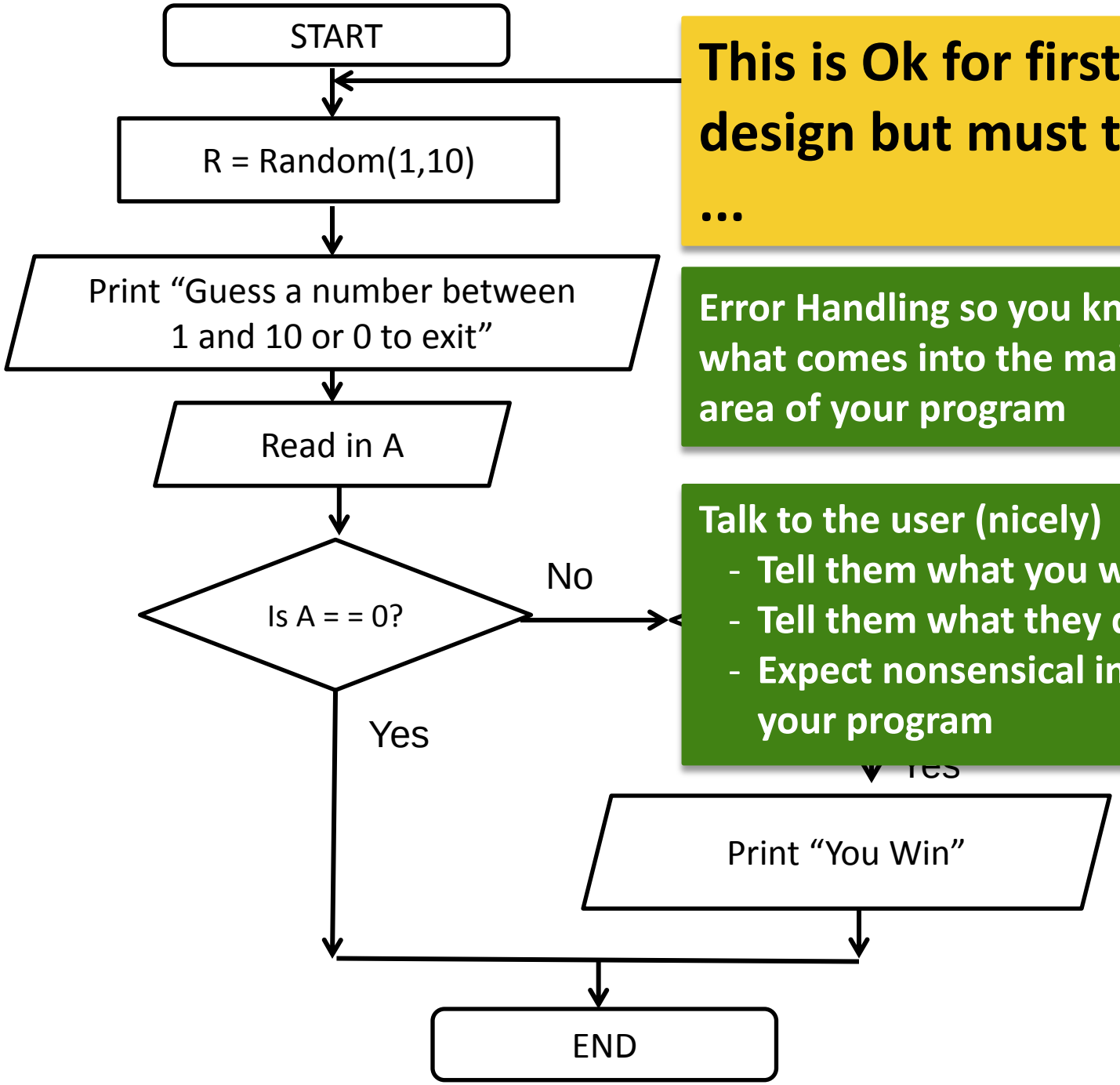
Input Error Handling

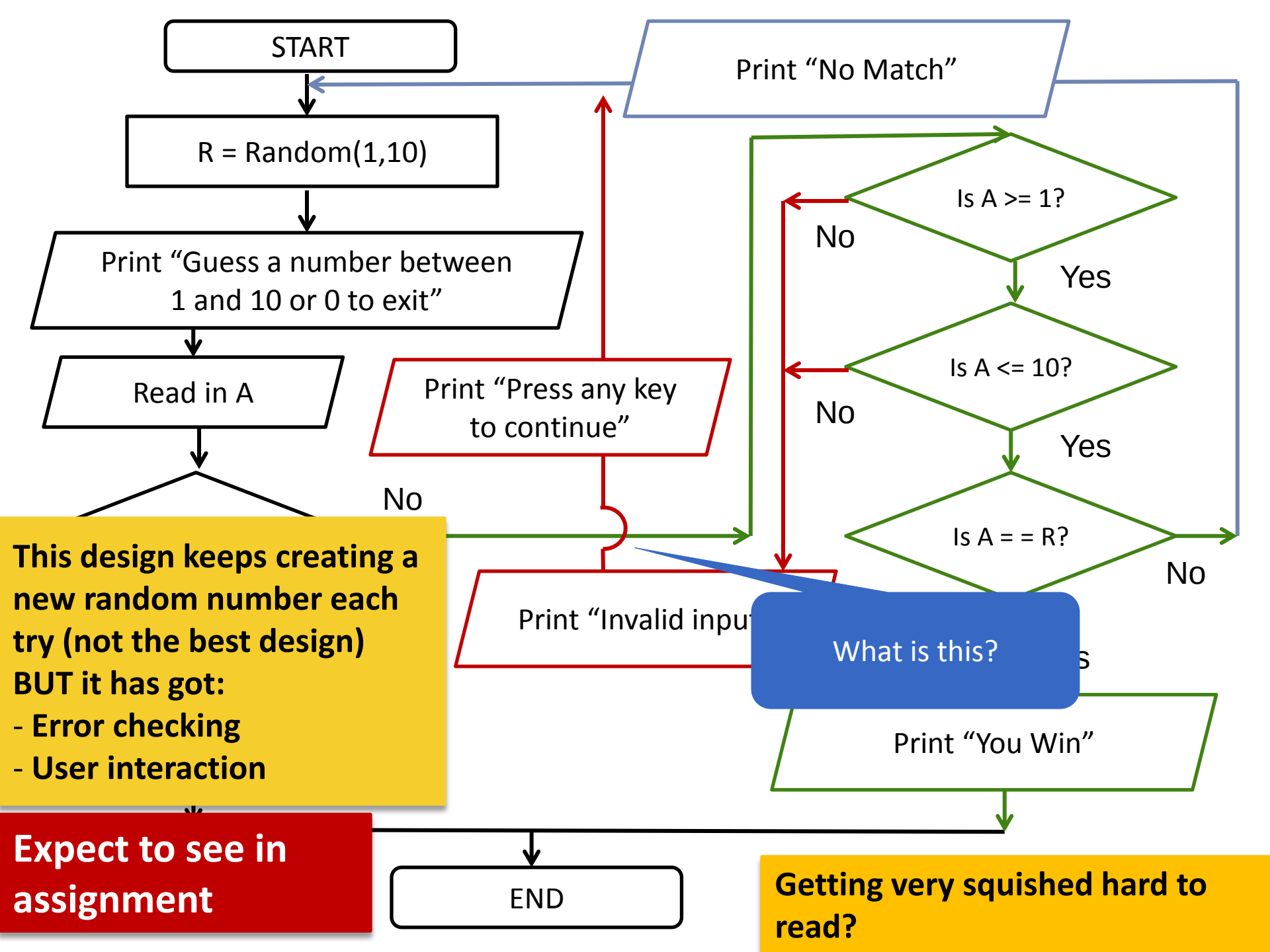
Expect to see in assignment

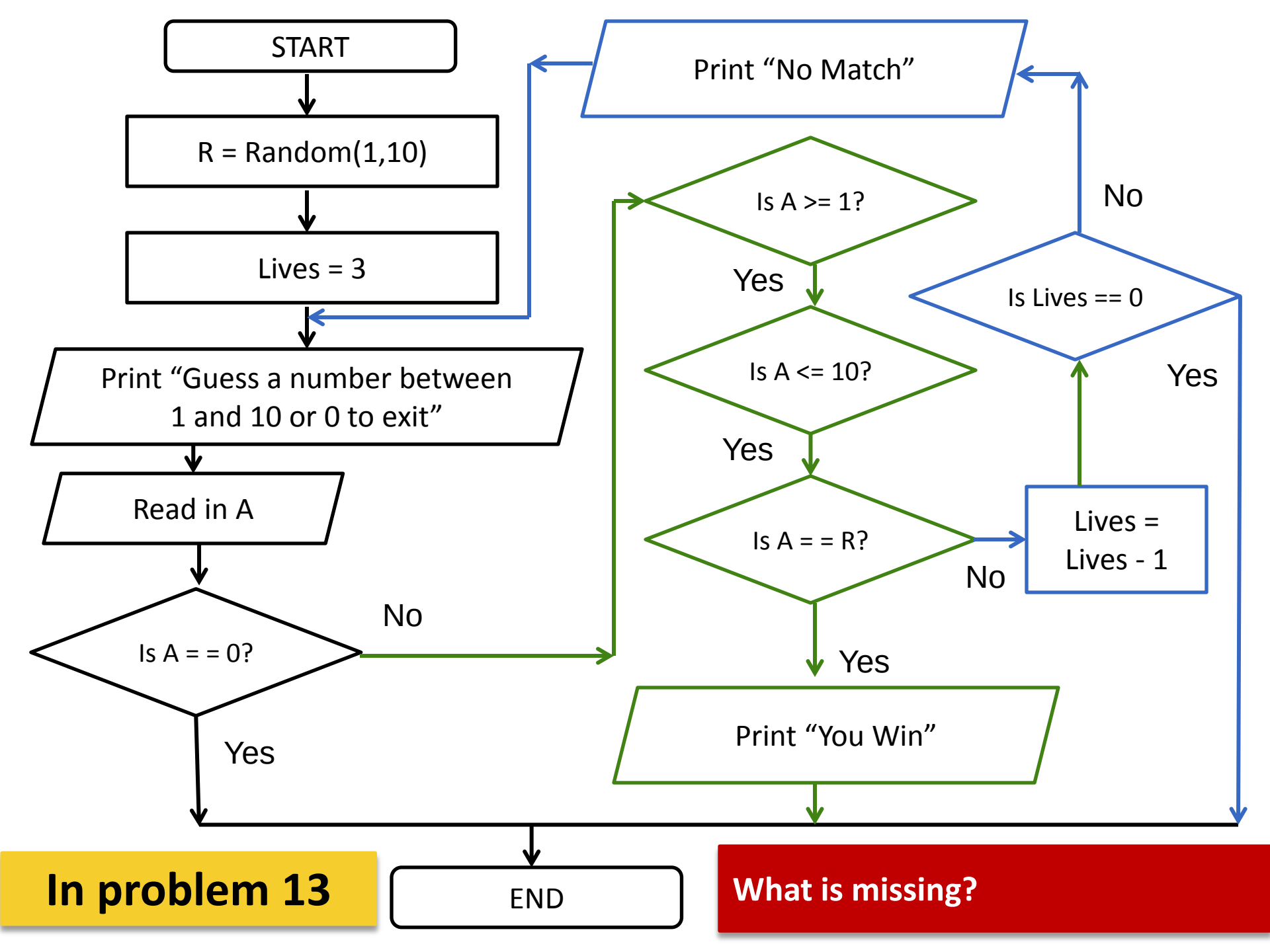
In problem 12



Should not be hoping straight into processing ... BUT

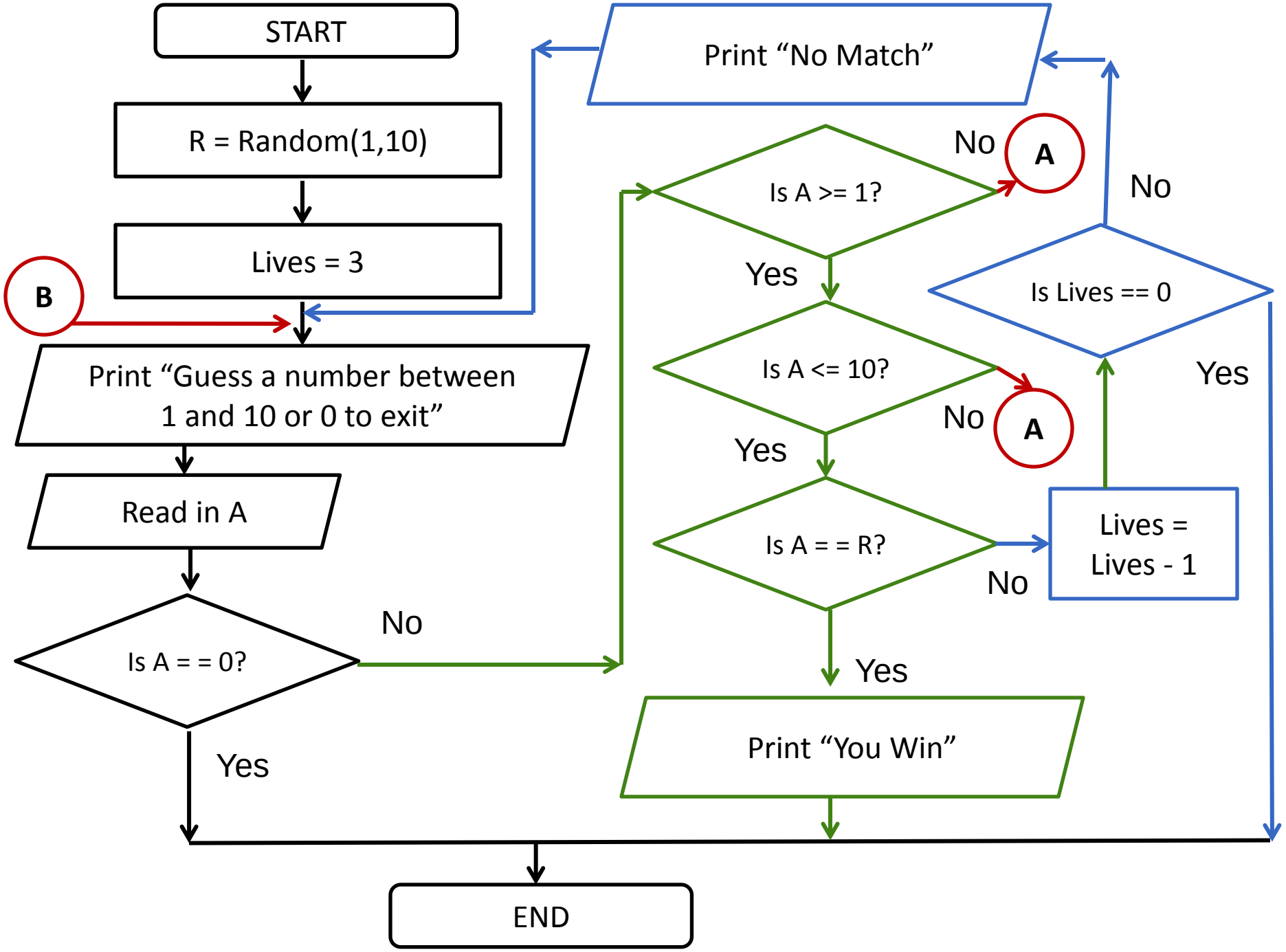

START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Is A = = 0?
No
Yes
Print “You Win”
END
This is Ok for first draft of design but must then add …
Error Handling so you know exactly what comes into the main processing area of your program
Talk to the user (nicely)
- Tell them what you want
- Tell them what they did wrong
- Expect nonsensical input : protect your program

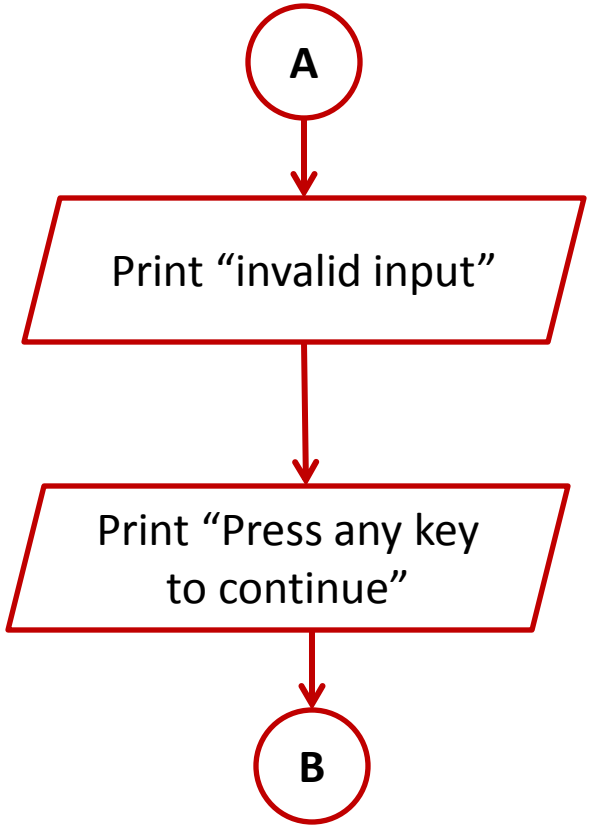

START
R = Random(1,10)
Print “Guess a number between 1 and 10 or 0 to exit”
Read in A
Print “Press any key to continue”
Print “No Match”
Is A >= 1?
No
Yes
Is A <= 10?
No
Yes
Is A = = R?
No
No
Print “Invalid input
What is this?
Print “You Win”
END
This design keeps creating a new random number each try (not the best design)
BUT it has got:
- Error checking
- User interaction
Expect to see in assignment
Getting very squished hard to read?



In problem 13

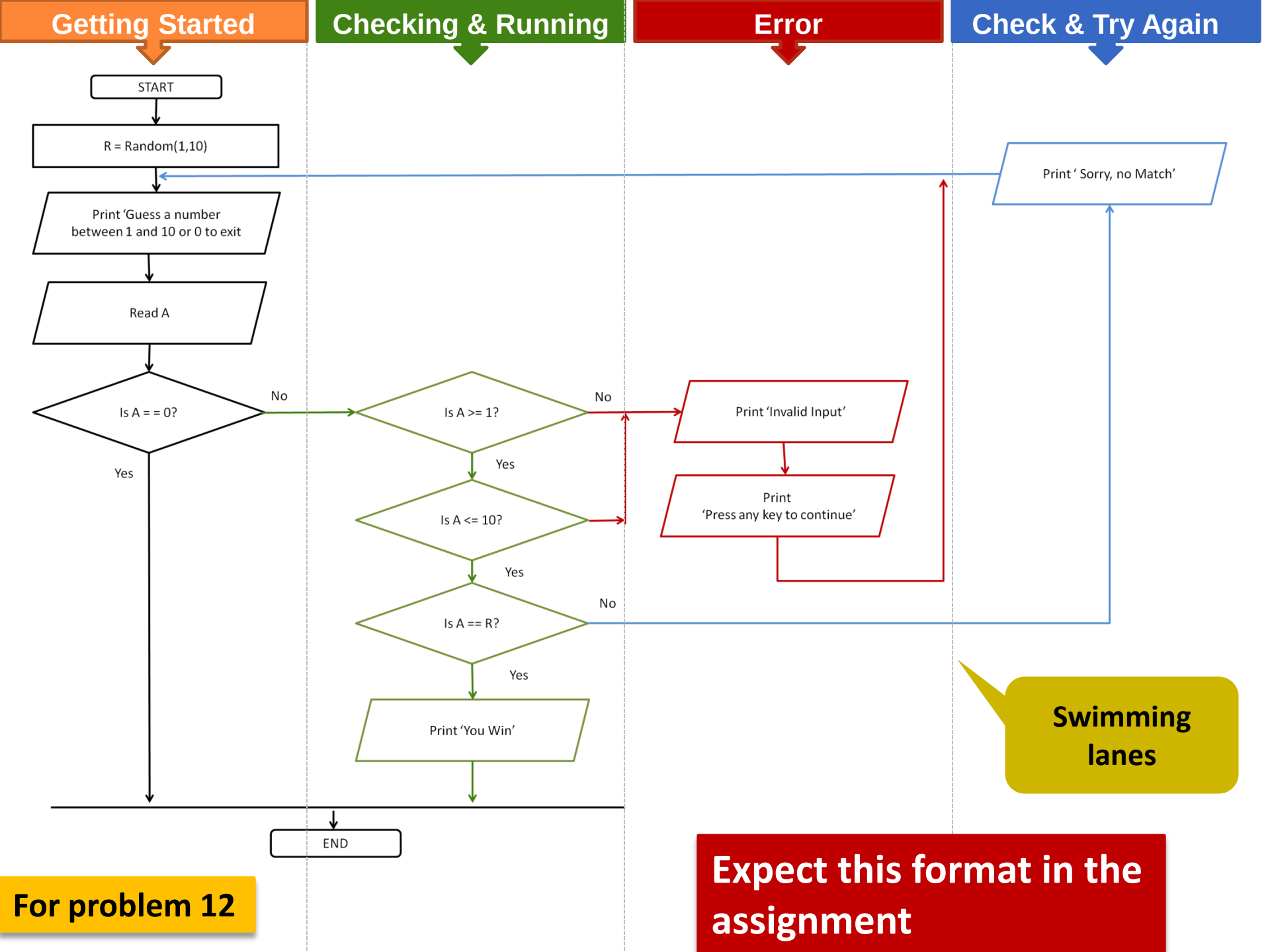
What is missing?

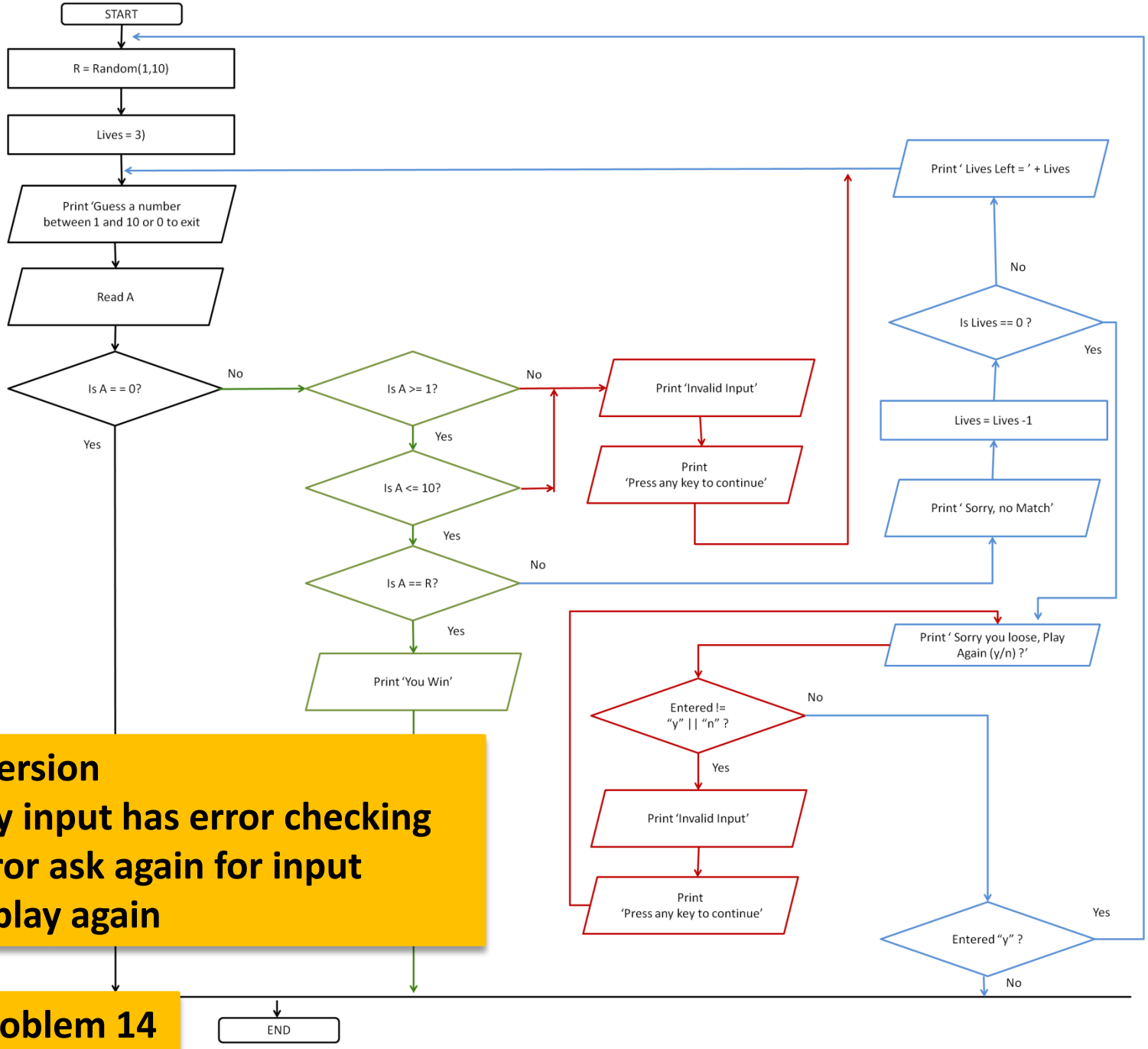

START
R = Random(1,10)
Lives = 3
B
Print "Guess a number between 1 and 10 or 0 to exit"
Read in A
Is A = = 0?
No
Yes
END
Print "No Match"
Is A >= 1?
No
A
Yes
Is A <= 10?
No
A
Yes
Is A = = R?
No
Lives = Lives - 1
Yes
Print "You Win"
Is Lives == 0
No
Yes



This is like a module or function
A piece of code that is used over and over again from multiple places in the code

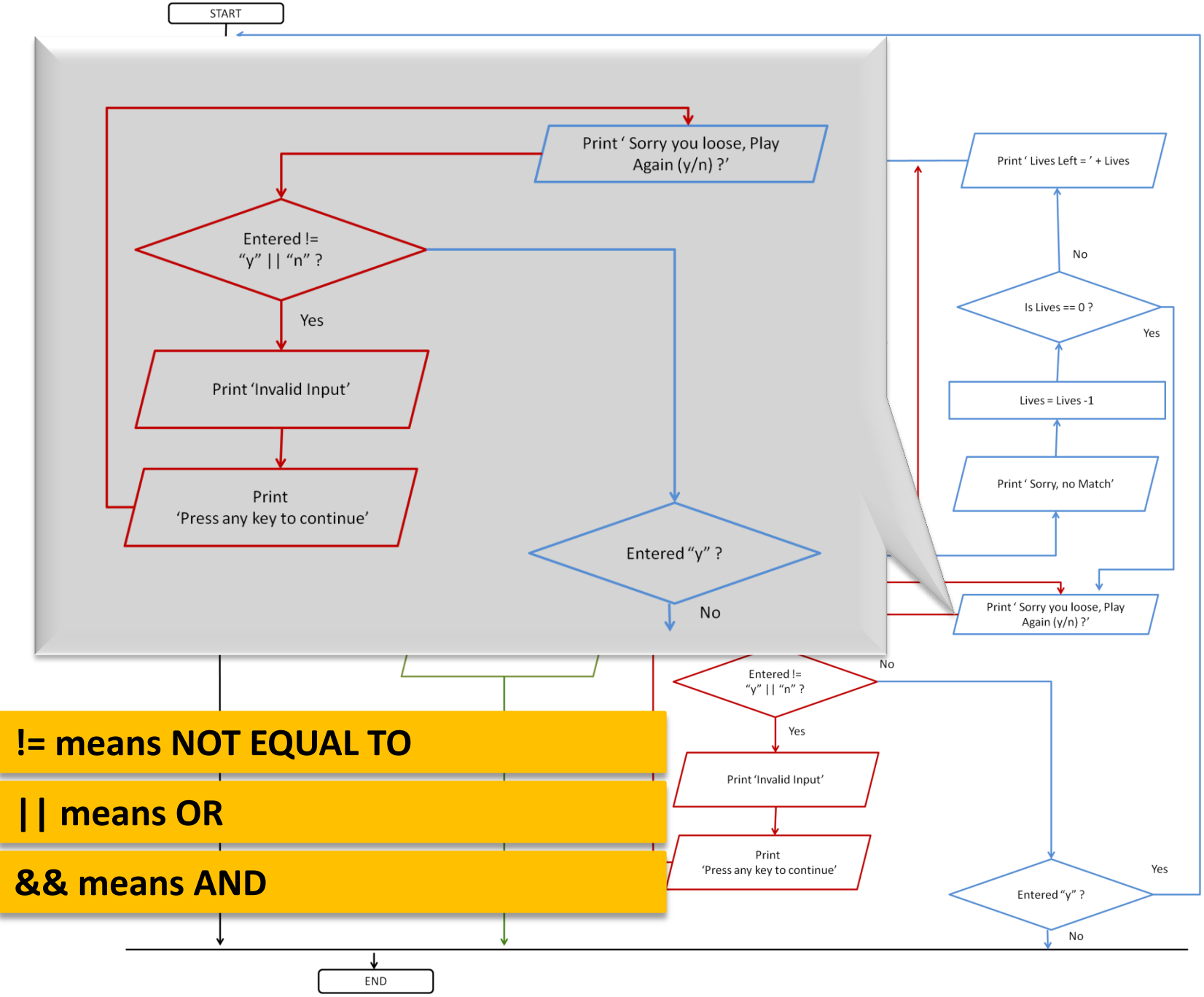
Also a good way to split things down if you start from a summary flowchart and start expanding


Getting Started
Checking & Running
Error
Check & Try Again
START
R = Random(1,10)
Print 'Guess a number between 1 and 10 or 0 to exit
Read A
Is A = = 0?
No
Yes
Is A >= 1?
No
Yes
Print 'Invalid Input'
Print 'Press any key to continue'
Is A <= 10?
Yes
Is A == R?
No
Yes
Print 'You Win'
Print ' Sorry, no Match'
END
Swimming lanes
For problem 12
Expect this format in the assignment



This version
- **Every input has error checking**
- **If error ask again for input**
- **Ask play again**

For problem 14

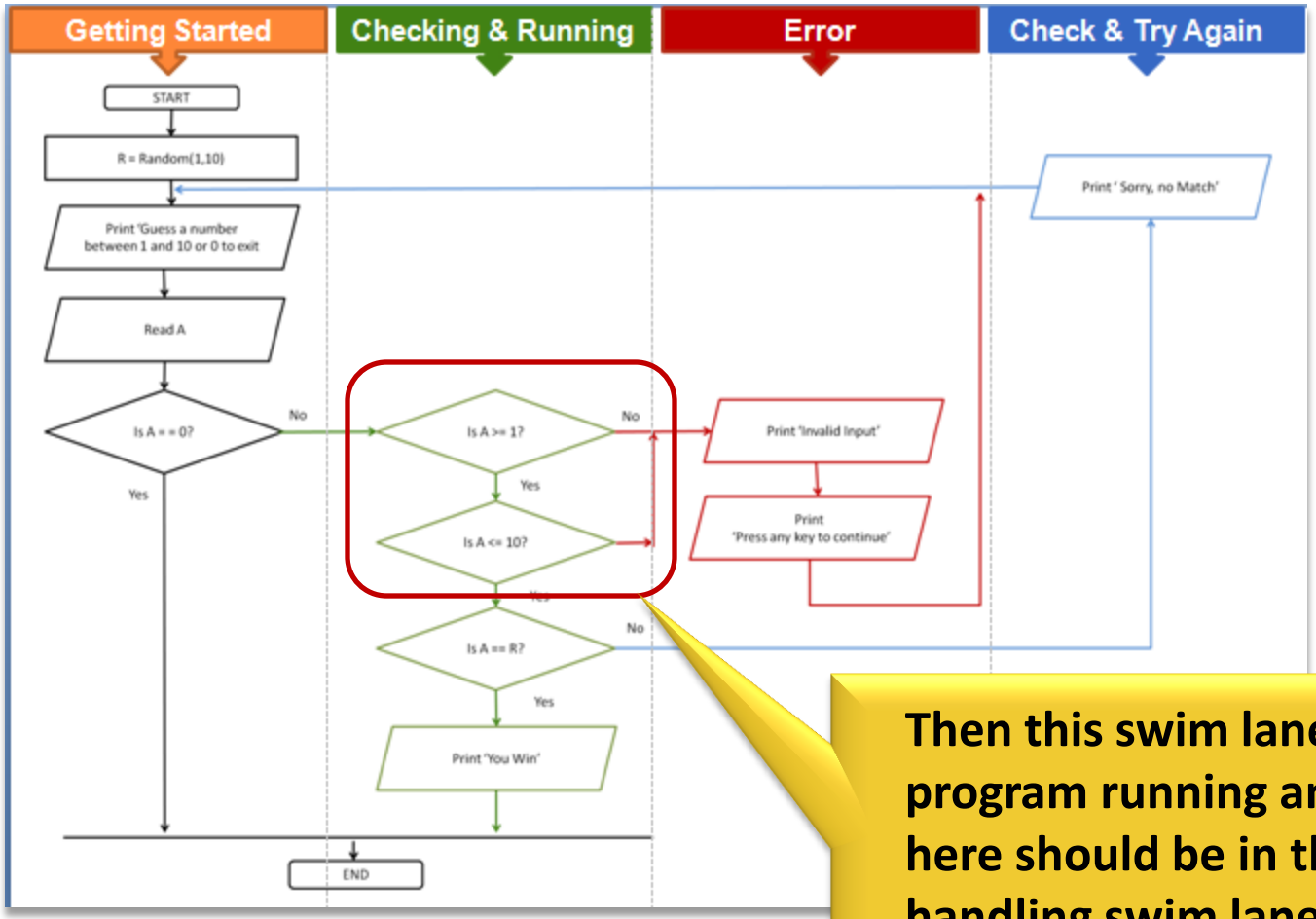


!= means NOT EQUAL TO

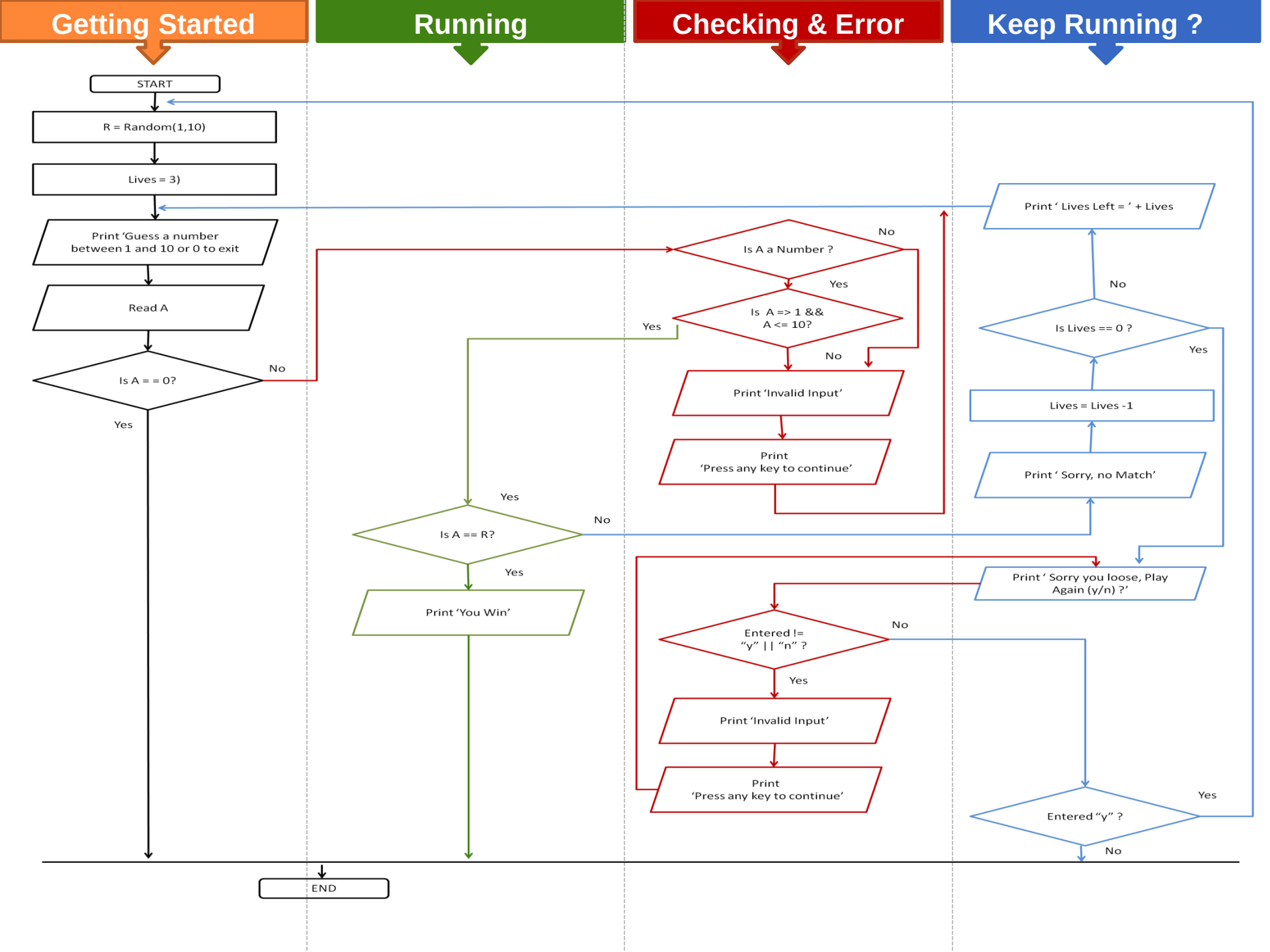
|| means OR

&& means AND

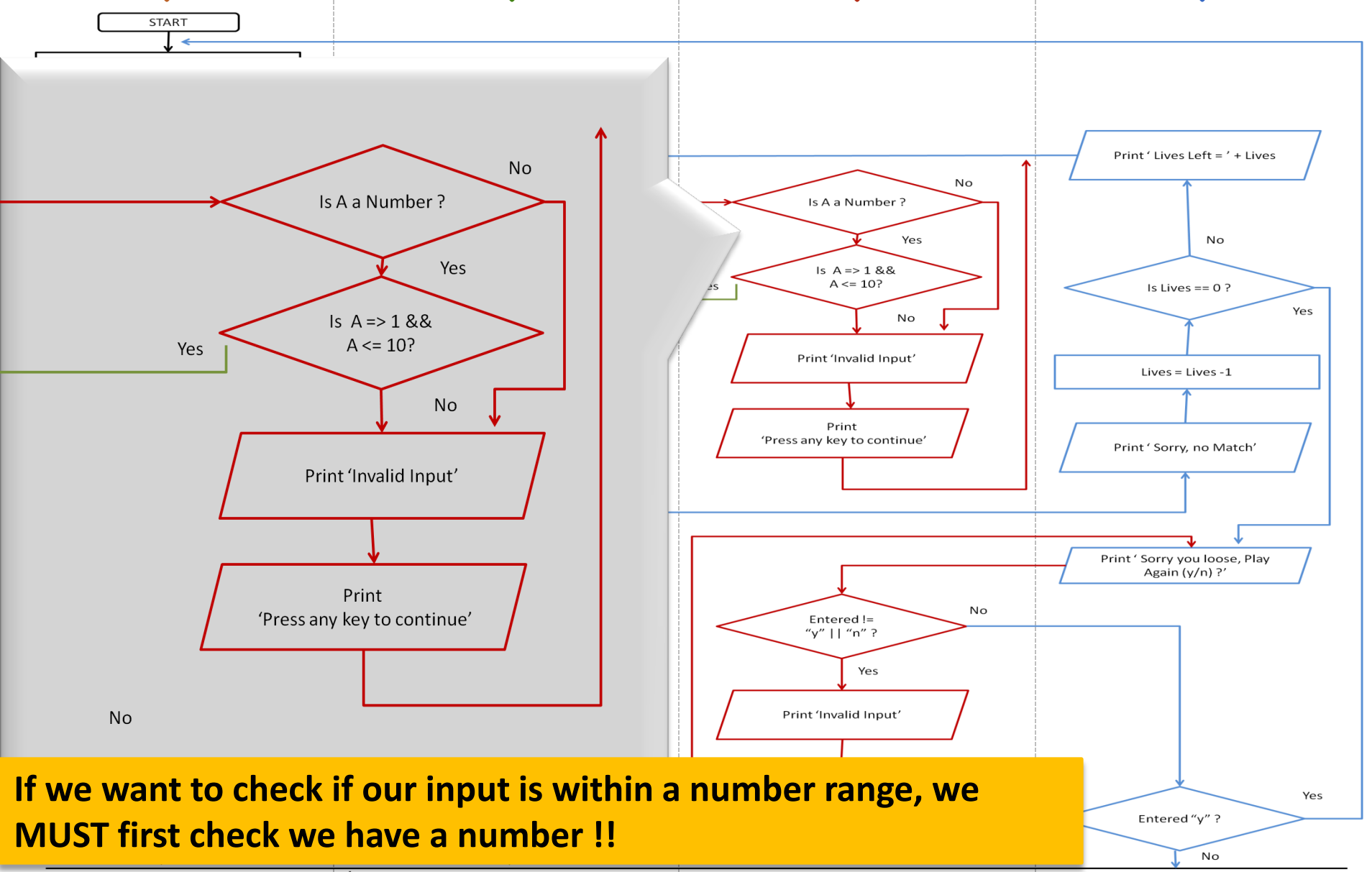
If we are thinking in terms of process swim lanes



Then this swim lane is about the program running and the checking here should be in the error handling swim lane and that lane should be called checking and error handling


Getting Started
Running
Checking & Error
Keep Running ?
START
R = Random(1,10)
Lives = 3)
Print 'Guess a number between 1 and 10 or 0 to exit
Read A
Is A = = 0?
No
Yes
Is A a Number ?
No
Yes
Is A => 1 && A <= 10?
Yes
No
Print 'Invalid Input'
Print 'Press any key to continue'
Is A == R?
Yes
No
Print 'You Win'
Print ' Lives Left = ' + Lives
No
Is Lives == 0 ?
Yes
Lives = Lives -1
Print ' Sorry, no Match'
Print ' Sorry you loose, Play Again (y/n) ?'
Entered != "y" || "n" ?
No
Yes
Print 'Invalid Input'
Print 'Press any key to continue'
Entered "y" ?
Yes
No
END

Getting Started | Running | Checking & Error | Keep Running ?



If we want to check if our input is within a number range, we MUST first check we have a number !!

Remember && means AND

References

- 2009, Barry, Paul and Griffiths, David; Head First Programming, O'Reilly Media Inc.
- 2009, Pine, Chris ; Learn to Program, 2nd Edition, The Pragmatic Programmers