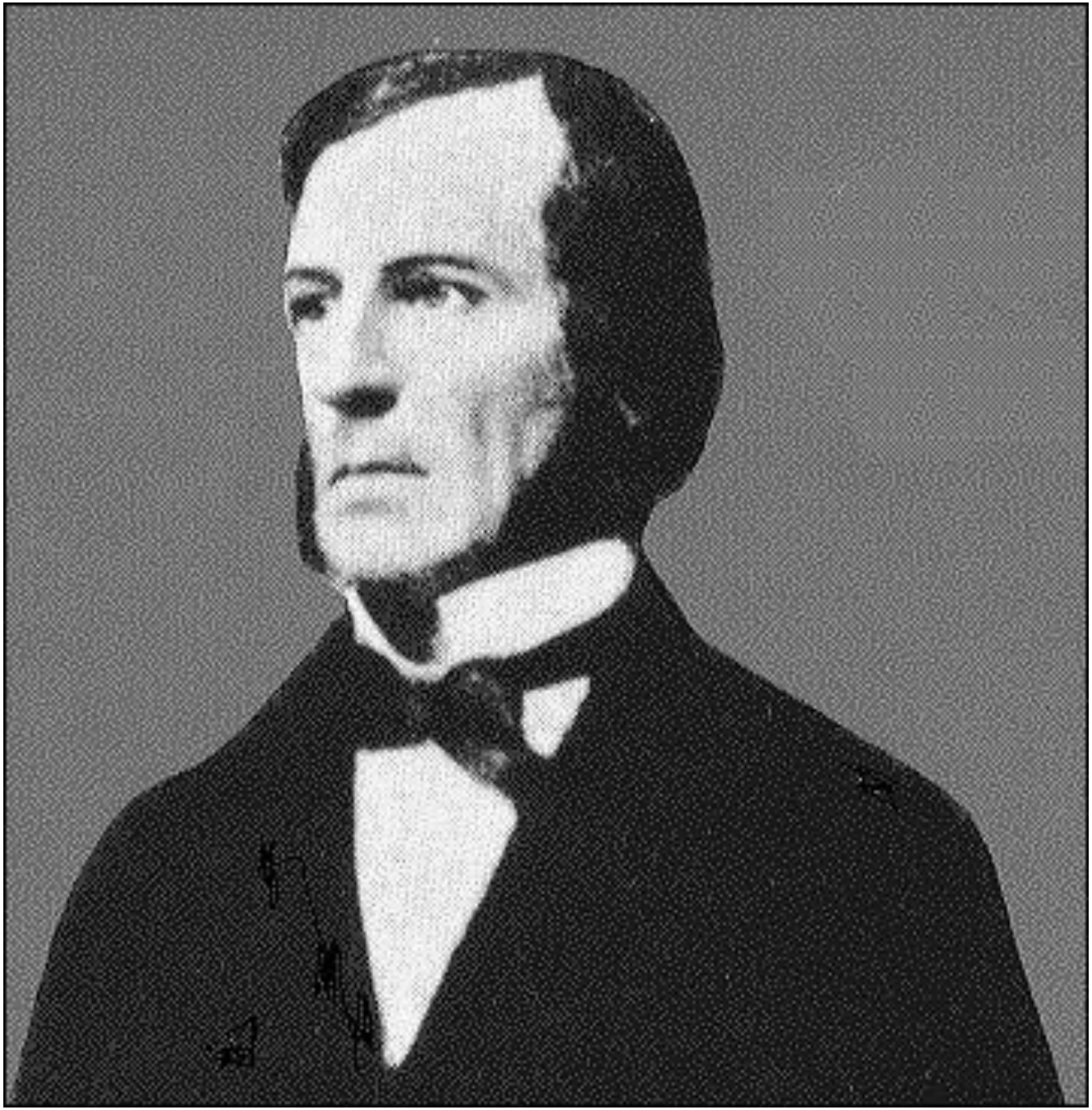
Boolean Algebra

Result in a True or False



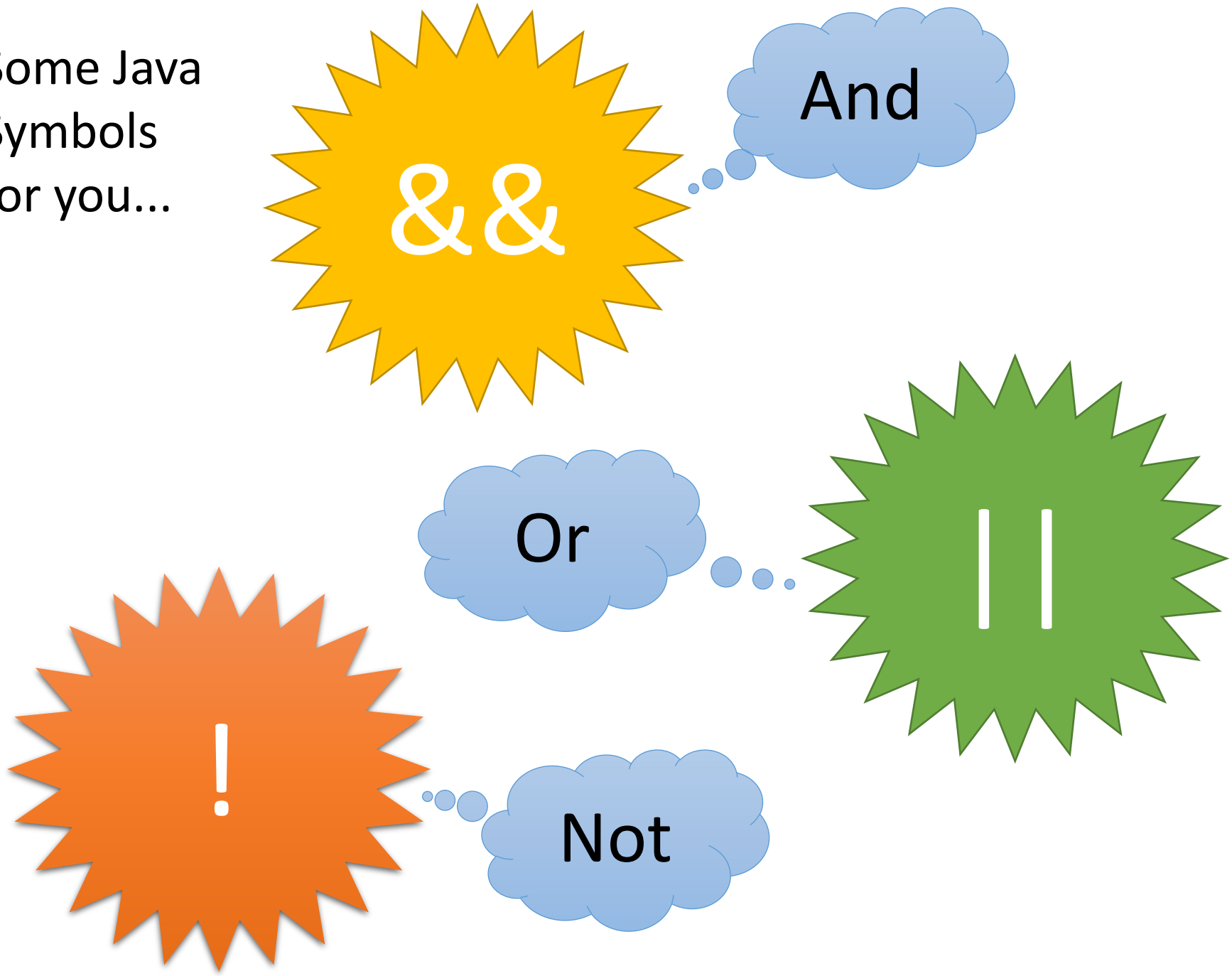


Named for

George Boole

1815-1865

Some Java Symbols for you...



2. What do each of the following Boolean operators mean?

&&		
||		
!		

Can you read this shirt now?



Boolean Algebra evaluates to only two answers.



Relational Operators

Operator	Meaning
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
==	Equal to
!=	Not equal to
.equals()	Equal for strings

1. What do each of the following relational operators mean?

==	
!=	
>	
>=	
<	
>=	

The variable num holds the value of 5.
Are these true or false?



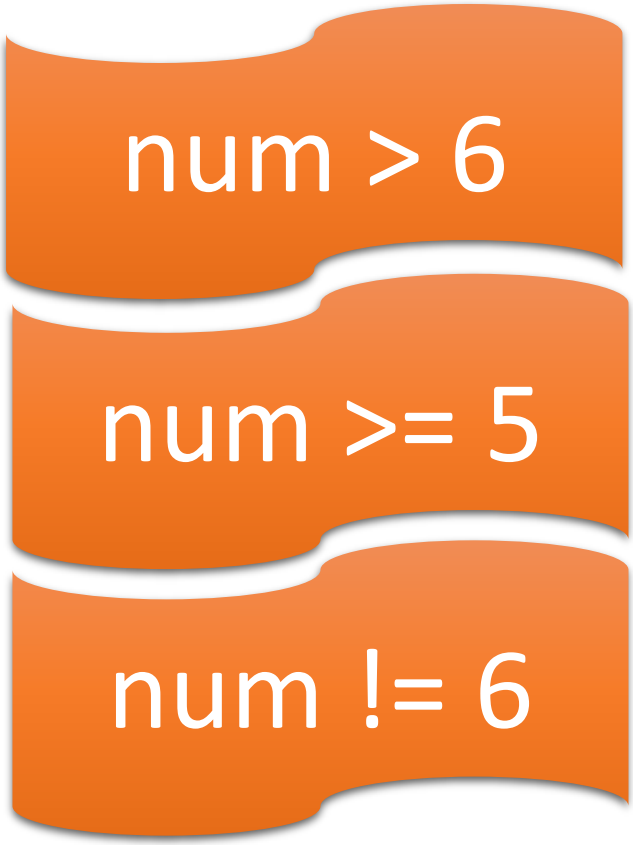
The variable num holds the value of 5.
Are these true or false?

num > 6

F

num >= 5

The variable num holds the value of 5.
Are these true or false?



F

T

The variable num holds the value of 5.
Are these true or false?

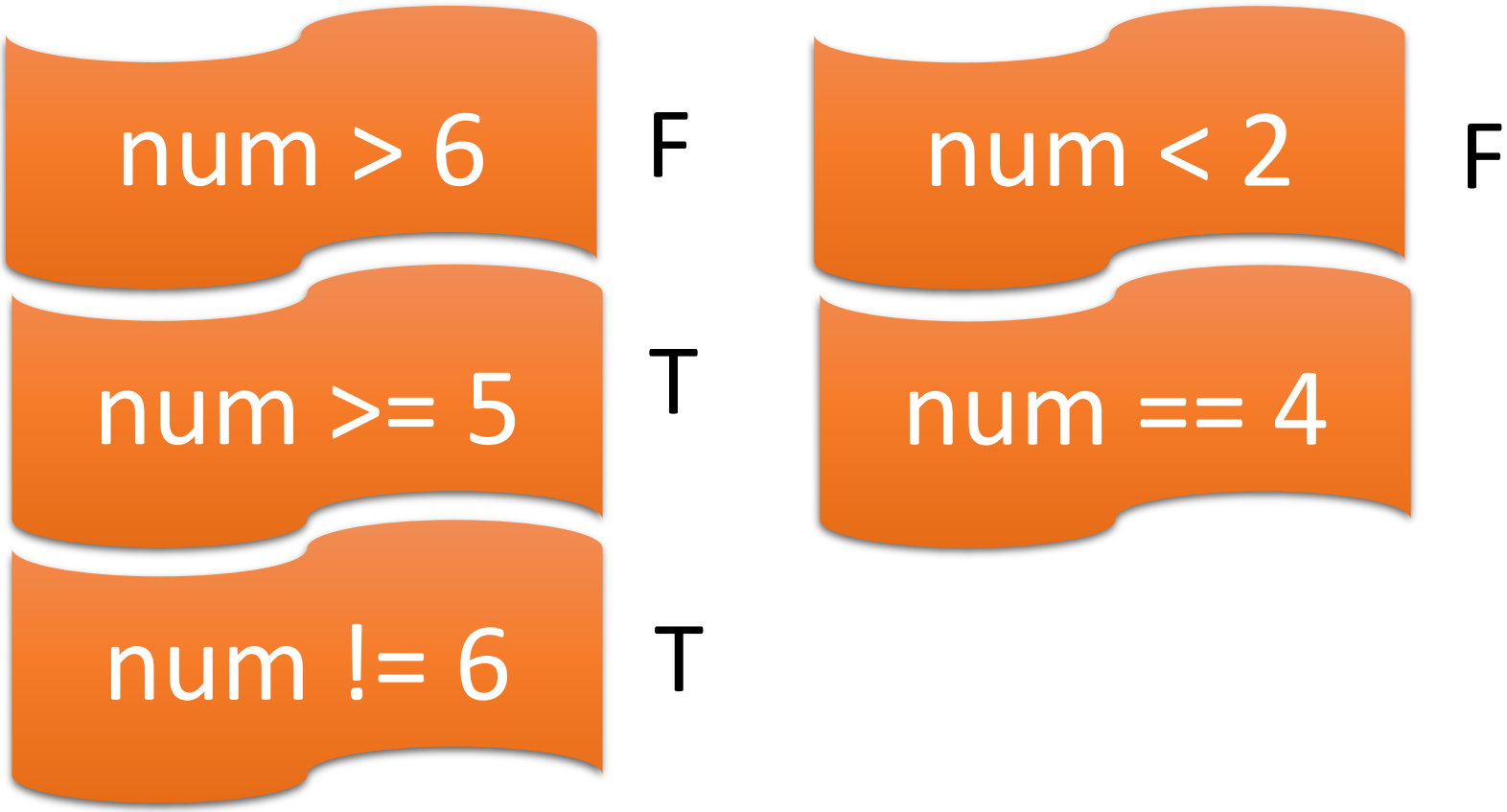
num > 6 F

num >= 5 T

num != 6 T

num < 2

The variable num holds the value of 5.
Are these true or false?



The variable num holds the value of 5.
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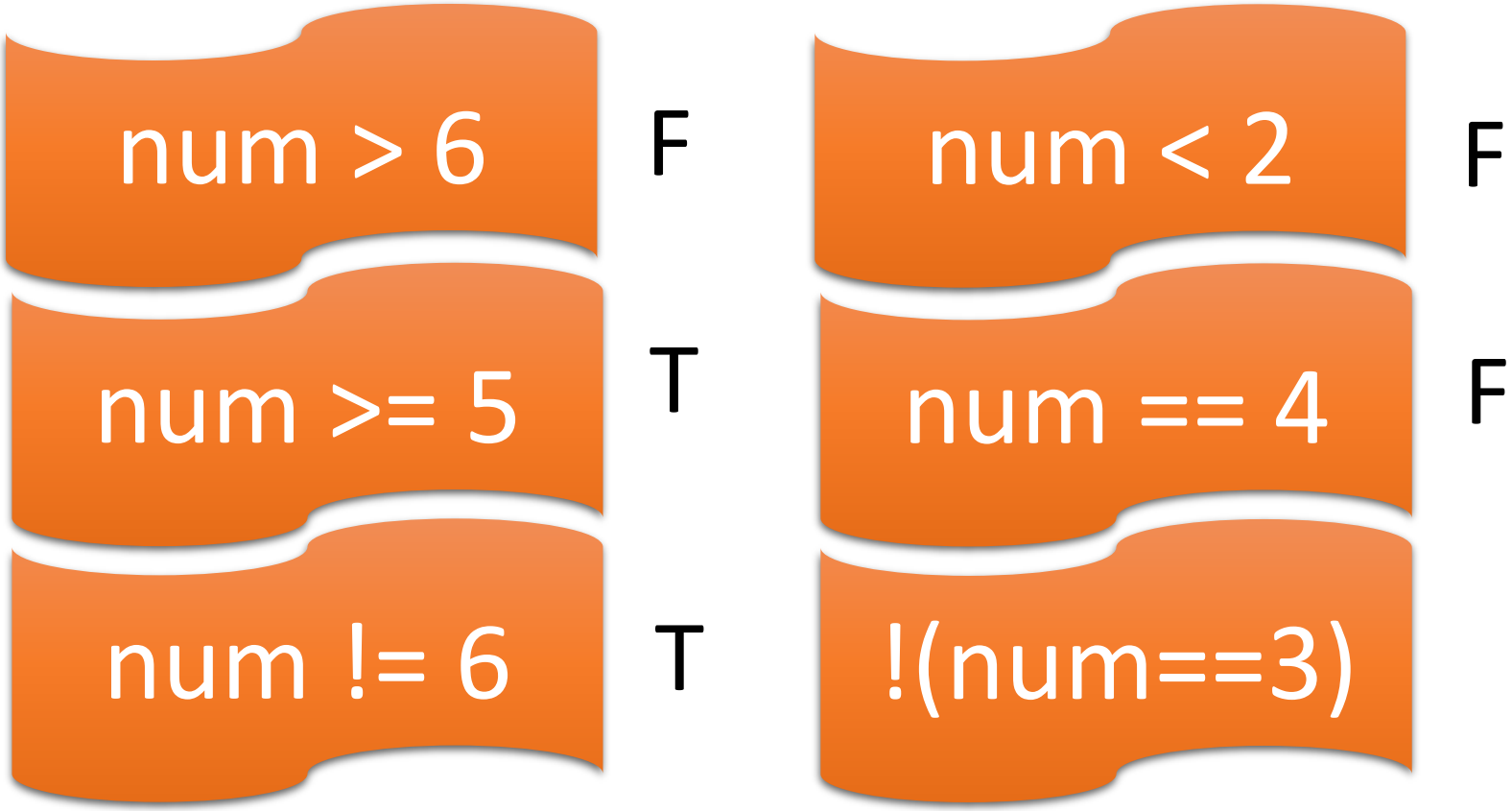

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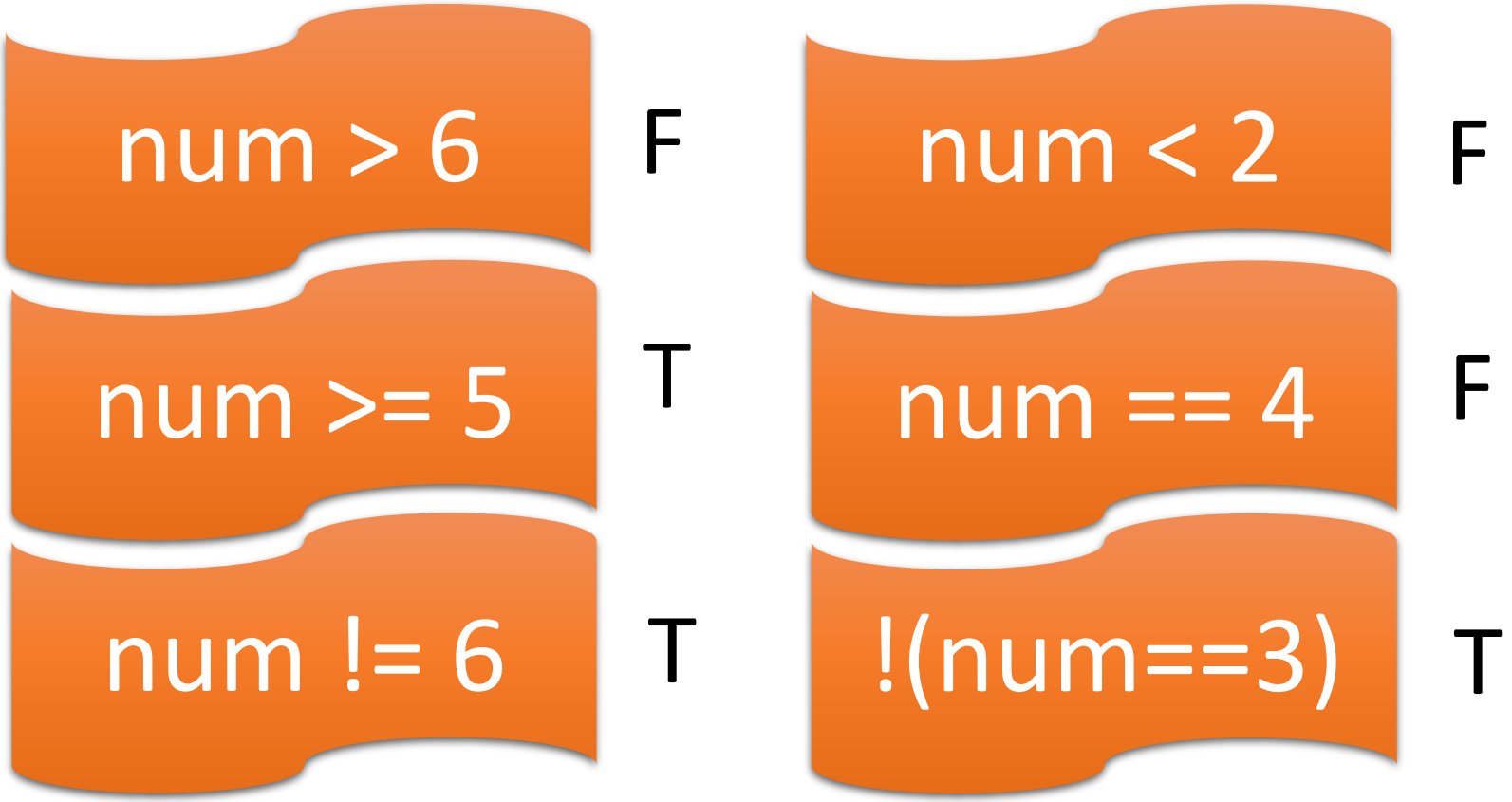

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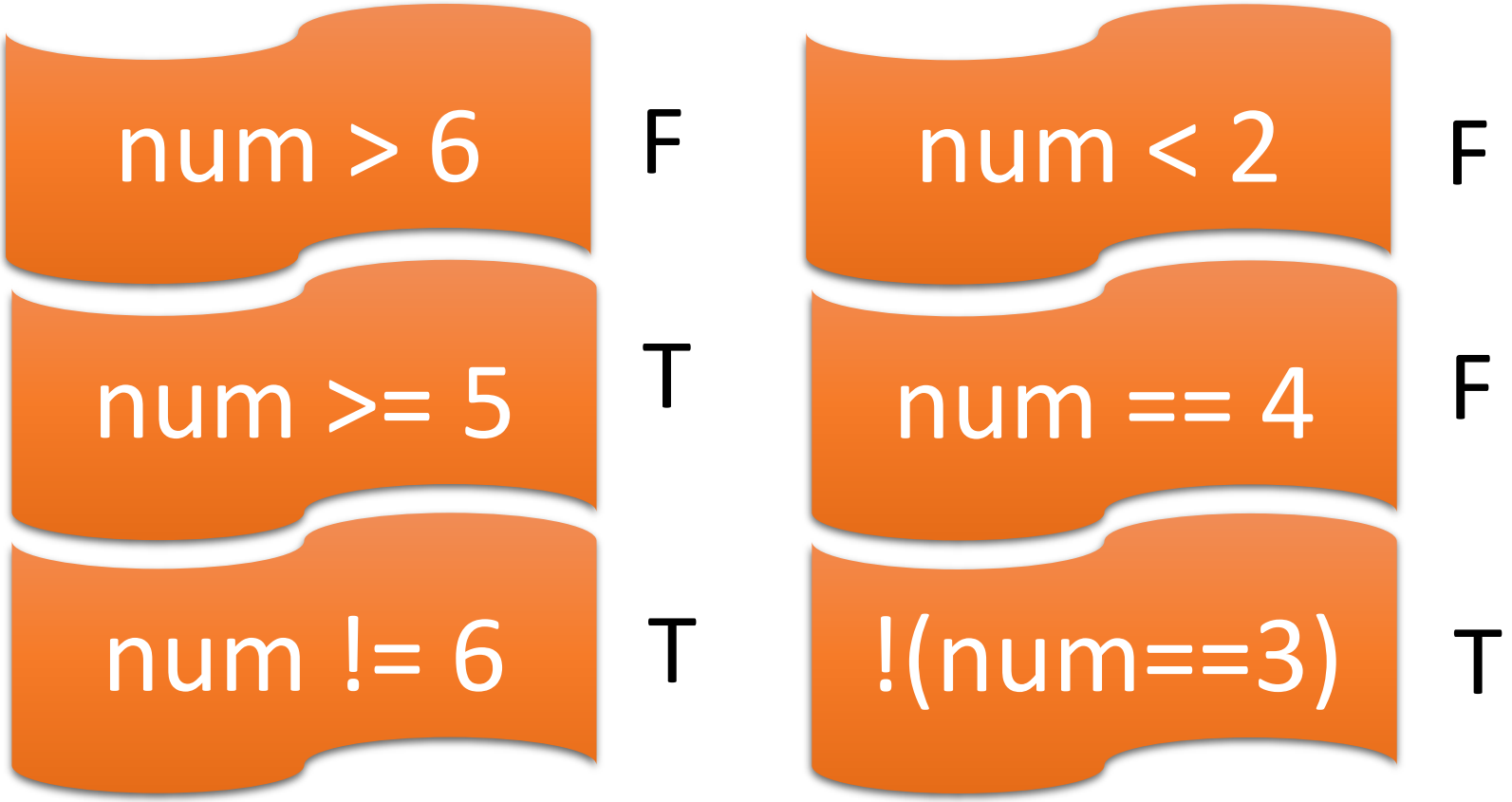
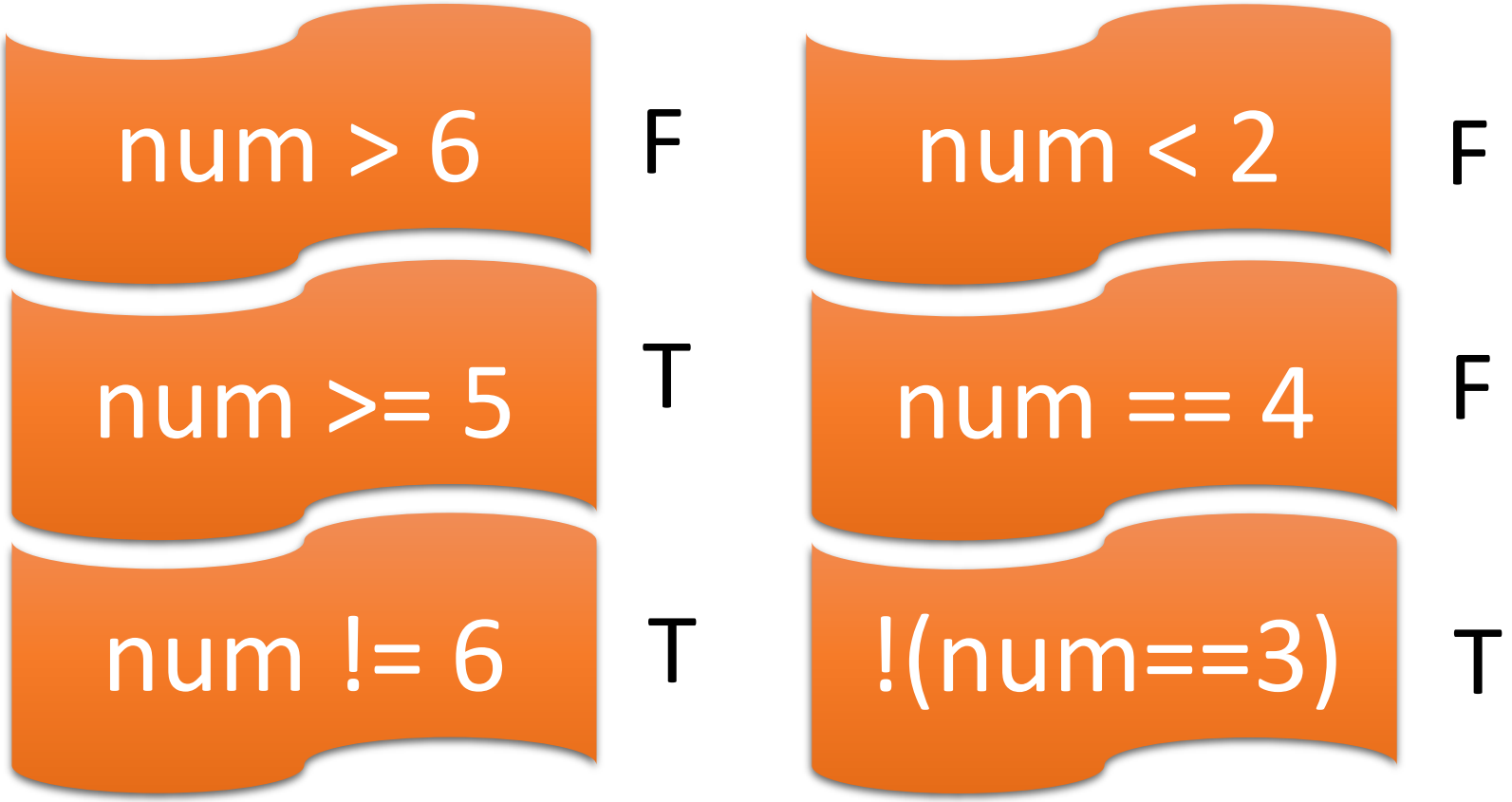
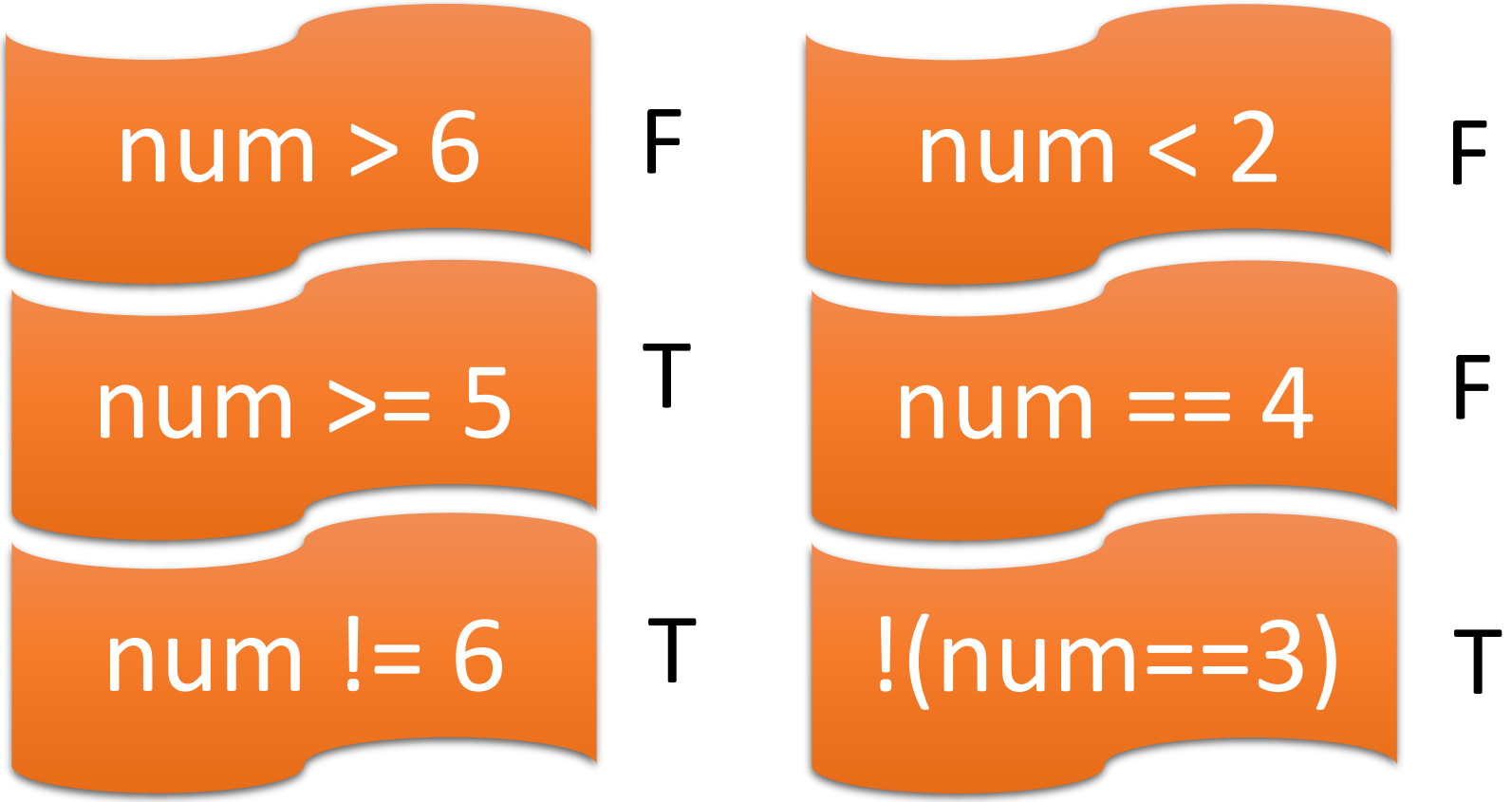
Are these true or false?



The variable num holds the value of 5.
Are these true or false?



The variable num holds the value of 5.
Are these true or false?



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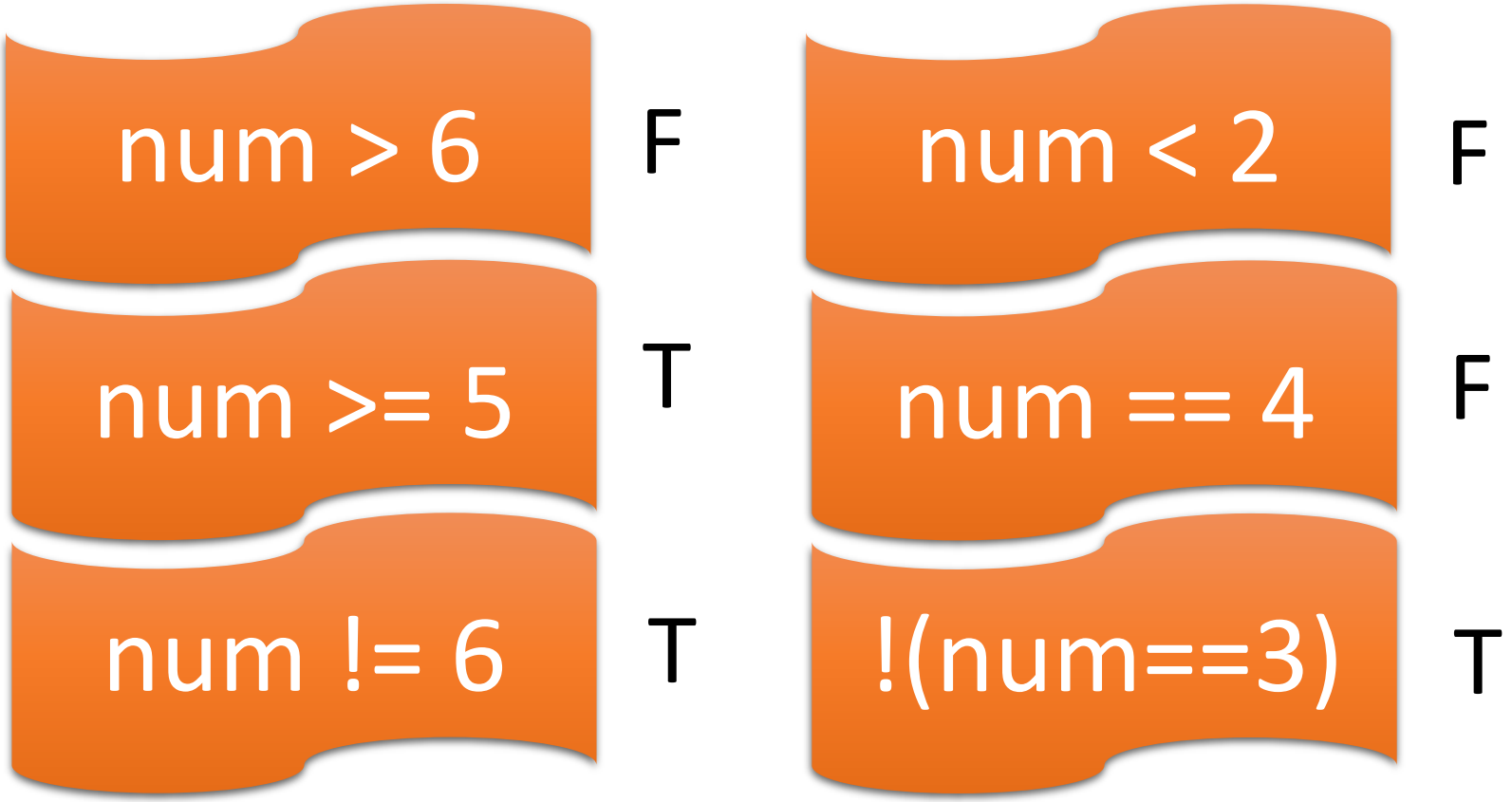
Are these true or false?





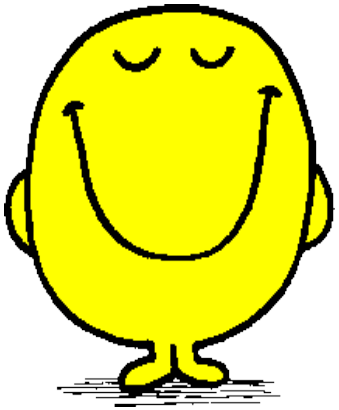
Says: “Yes or no? I won’t take anything else for an answer!”


BOOLE ORDERS LUNCH
NO, NO, YES, NO, NO, YES,
YES, NO, NO, NO, YES...
Menu

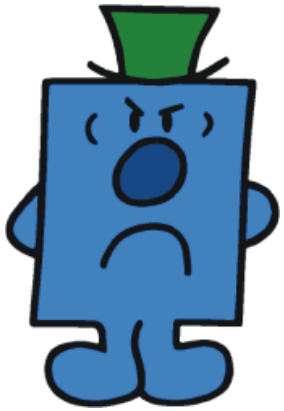

Would you like some cake && ice cream?

Depending on what you give them, the kid is either happy or sad.

True



False





&&



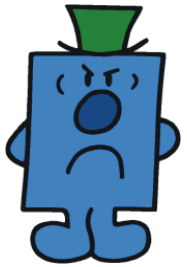
=





&&

=

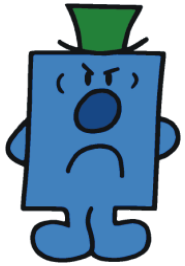


Where's my ice cream?

&&



=



Where's my cake?

&&

=



Where's my cake and ice cream?

And Truth Table

Value 1		Value 2		Answer
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

3.Evaluate the following.

a) What is the symbol for and? ___	AND	OR
b) What is the symbol for or? ___	f) What is T && T? ___	j) What is T || T? ___
c) What is the symbol for not? ___	g) What is T && F? ___	k) What is T || F? ___
d) What is !T? ___	h) What is F && T? ___	l) What is F || T? ___
e) What is !F? ___	i) What is F && F? ___	m) What is F || F? ___

If x is 4 and y is 7…

Evaluate

(x>3) && (x<9)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

If x is 4 and y is 7…

Evaluate

(x>3) && (x<9)
= (4>3) && (4<9)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

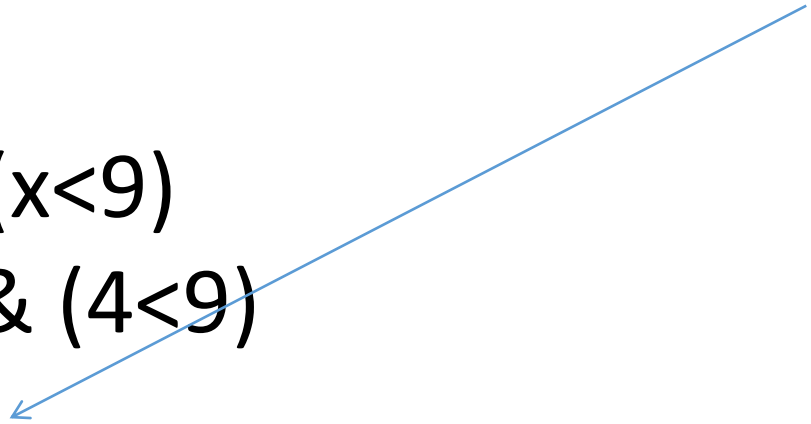
If x is 4 and y is 7…

Evaluate

(x>3) && (x<9)

= (4>3) && (4<9)

= T && T



				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

If x is 4 and y is 7…

Evaluate

(x>3) && (x<9)
= (4>3) && (4<9)
= T && T
= T

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

If x is 4 and y is 7…

Evaluate

(x>3) && (x<9)
= (4>3) && (4<9)
= T && T
= T

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F


What can go in the recycling bin?
Paper || Plastic



||



=


WE
RECYCLE



||

=


WE
RECYCLE

||



=


WE
RECYCLE

||

=


WE
RECYCLE

OR Truth Table

Value 1		Value 2		Answer
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

3.Evaluate the following.

a) What is the symbol for and? ___	AND	OR
b) What is the symbol for or? ___	f) What is T && T? ___	j) What is T || T? ___
c) What is the symbol for not? ___	g) What is T && F? ___	k) What is T || F? ___
d) What is !T? ___	h) What is F && T? ___	l) What is F || T? ___
e) What is !F? ___	i) What is F && F? ___	m) What is F || F? ___

If x is 4 and y is 7…

Evaluate

(x==3) || (y>9)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

If x is 4 and y is 7…

Evaluate

(x==3) || (y>9)

= (4==3) || (7>9)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

If x is 4 and y is 7…

Evaluate

(x==3) || (y>9)
= (4==3) || (7>9)
= F || F

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

If x is 4 and y is 7…

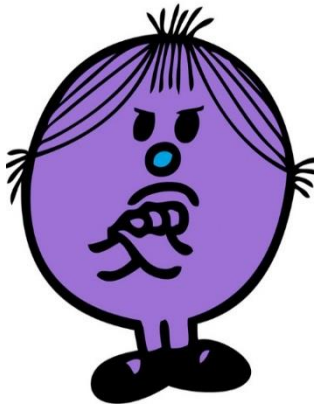
Evaluate

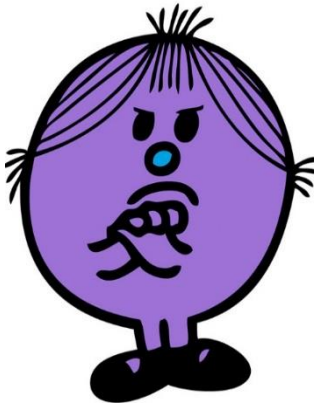
(x==3) || (y>9)
= (4==3) || (7>9)
= F || F
= F

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F


!talking
to
you.

!  = 

!  = 

NOT Truth Table

Value		Answer
!T	=	F
!F	=	T

3.Evaluate the following.

a) What is the symbol for and? ___	AND	OR
b) What is the symbol for or? ___	f) What is T && T? ___	j) What is T || T? ___
c) What is the symbol for not? ___	g) What is T && F? ___	k) What is T || F? ___
d) What is !T? ___	h) What is F && T? ___	l) What is F || T? ___
e) What is !F? ___	i) What is F && F? ___	m) What is F || F? ___

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))

= !(!(4<=7) && !(7!=9))

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))
= !(!(4<=7) && !(7!=9))
= !(!T && !T)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))
= !(!(4<=7) && !(7!=9))
= !(!T && !T)
= !(F && F)

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))
= !(!(4<=7) && !(7!=9))
= !(!T && !T)
= !(F && F)
=!F

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

If x is 4 and y is 7…

Evaluate

!(!(x<=7) && !(y!=9))
= !(!(4<=7) && !(7!=9))
= !(!T && !T)
= !(F && F)
=!F
=T

				Ans
T	&&	T	=	T
T	&&	F	=	F
F	&&	T	=	F
F	&&	F	=	F

				Ans
T	||	T	=	T
T	||	F	=	T
F	||	T	=	T
F	||	F	=	F

		Ans
!T	=	F
!F	=	T

5. In each pair, circle the one which creates the correct code to make a Boolean Expression.

(a)	`one => two`	or	`one >= two`
(b)	`one = two`	or	`one == two`
(c)	`one > two > three`	or	`one > two && two > three`

8. Write a Boolean expression to represent each of the following:

(a) x is greater than 34 _____

(b) x is less than or equal to 25 _____

(c) x is not equal to 3 _____

(d) x is between 1 and 12 _____

(e) x is over 17 _____

(f) x is under 17 _____

(g) x equals 3 or 5 _____

(h) x equals 5 or 9 _____

9. AND expressions.

If I want x to be between 1 and 4, I write (x>=1 && x <=4).

Fill in the following.

a) x is between 5 and 9 _____

b) x is between 4 and 10 _____

c) x is between 2 and 100_____

d) x is between 6 and 99 _____

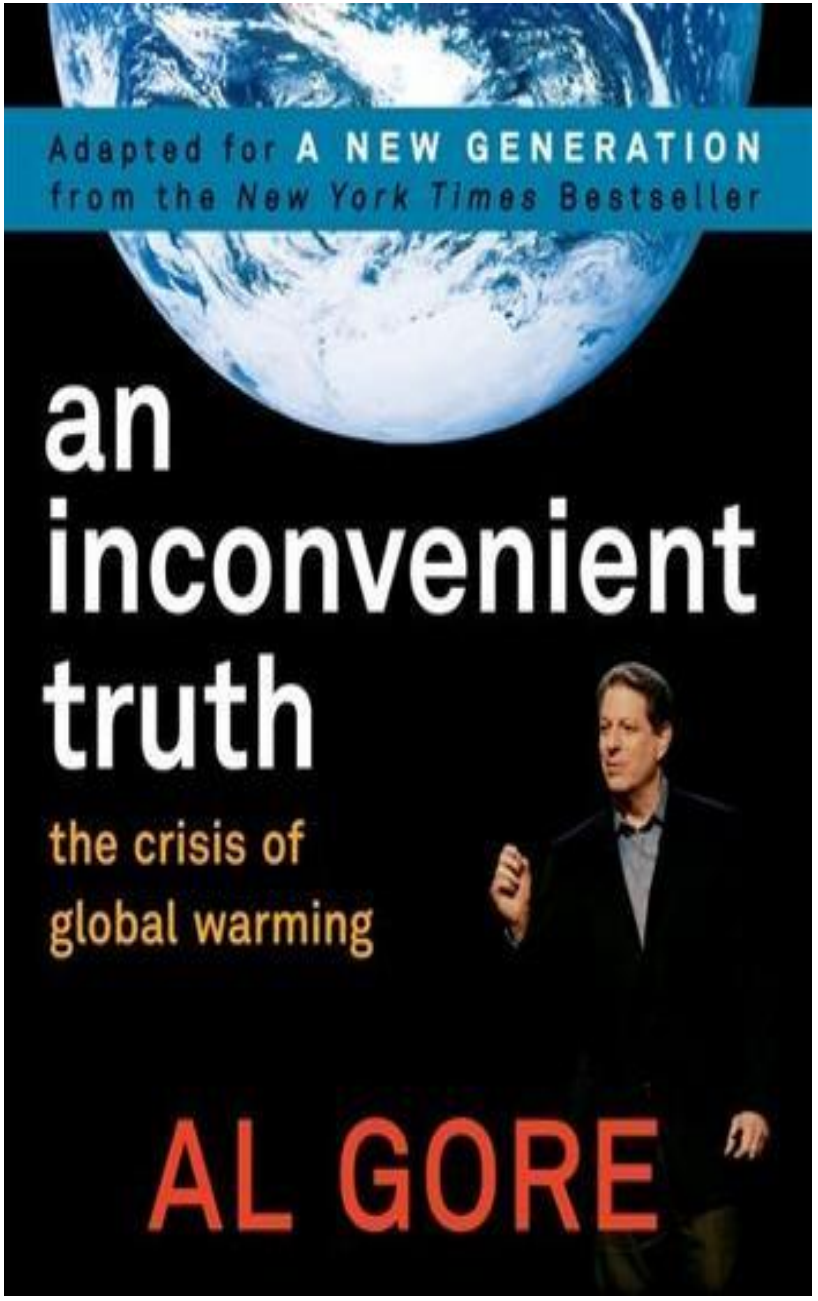

Some jokes.

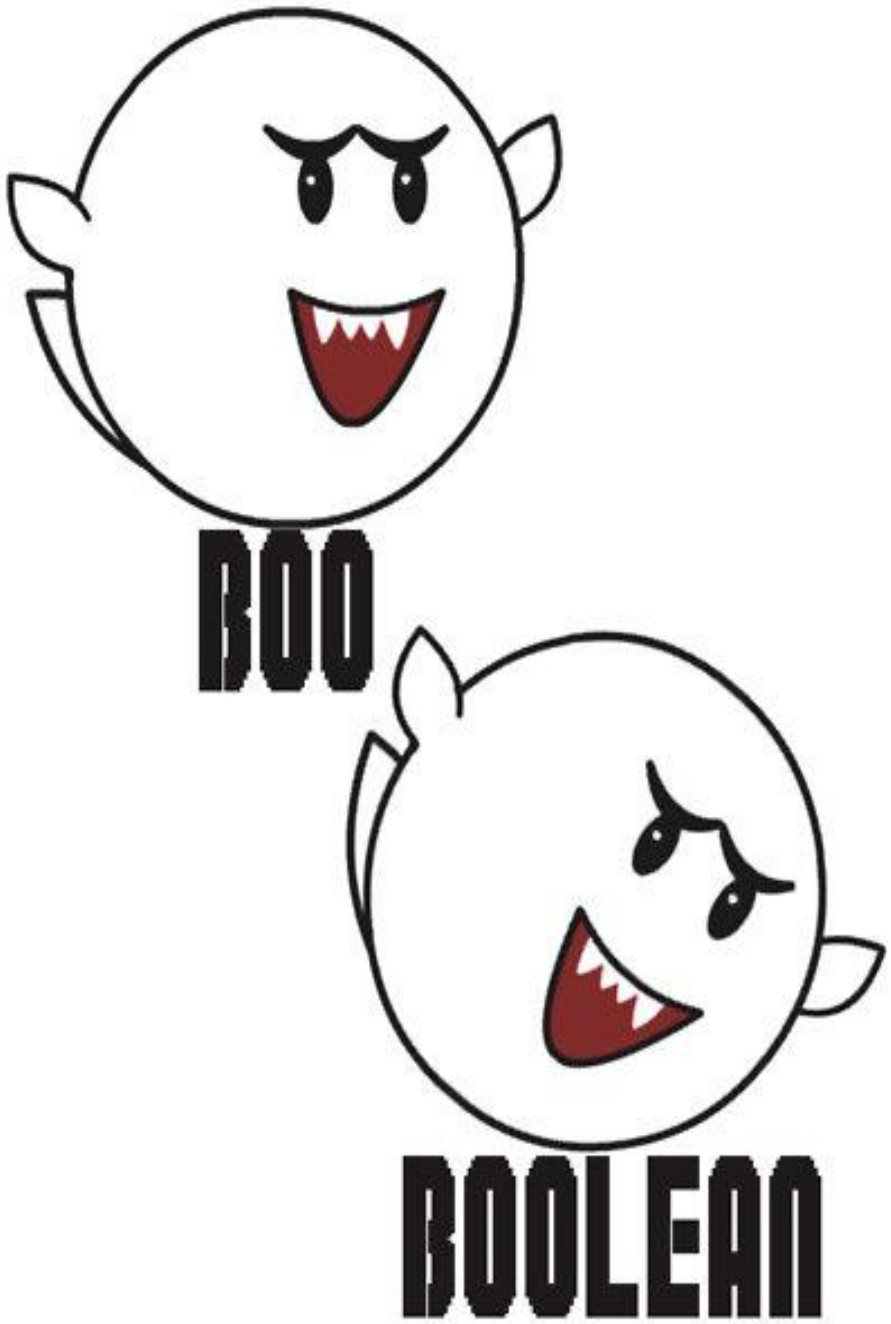

YOU CAN'T
HANDLE
THE BOOLEAN!


You can't handle
the truth!

an
inconvenient
boolean

the crisis of
global variables




BOO
BOOLEAN

ICS2O0 - Unit 2: Decisions & Ifs

Boolean Expressions

2.1 K

What do each of the following relational operators mean?

==	!=	>	>=	<

Boolean Expression

- A mathematical expression that evaluates to _____ or _____
- They are used to control ifs and loops when programming

NOT !

a) Evaluate !T ___

b) Evaluate !F ___

AND &&

c) Evaluate T && T ___

d) Evaluate T && F ___

e) Evaluate F && T ___

f) Evaluate F && F ___

OR ||

g) Evaluate T || T ___

h) Evaluate T || F ___

i) Evaluate F || T ___

j) Evaluate F || F ___

Write expressions for each of the following:

x is between 5 and 9	x is under 4 or over 10	x is not greater than 12

If x is 6 then evaluate the following.

(a) `!(x != 6)`

`= !(_____ != 6)`

`= !(_____)`

`= _____`

(b) `x > 4 && x < 9`

`= ___ > 4 && ___ < 9`

`= ___ && _____`

`= ___`

(c) `!(x < 2 || x > 5)`

`= !(___ < 2 || ___ > 5)`

`= !(___|| ___)`

`= !_____`

`=`