UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

Essential Data Skills for Business Analytics

Lecture 3: Condition Statements

Decision, Operations & Information Technologies
Robert H. Smith School of Business
Spring, 2020

The modulus operator

- It works on integers (and integer expressions) and yields the remainder when the first operand is divided by the second.

```
>>> quotient = 7 / 3
>>> print (quotient)
2.3333333333333335
>>> remainder = 7 % 3
>>> print (remainder)
1
```

Use case (1)

- You can check whether one number is divisible by another – if x % y is zero, the x is divisible by y

```
>>> isdivisible = 6 % 3
>>> print (isdivisible)
0
>>> isnotdivisible = 7 % 3
>>> print (isnotdivisible)
1
```

Use case (2)

- You can extract the right-most digit or digits from a number.
  - For example, the last two digits in 123491 is 91.

```
>>> lasttwodigits = 123491 % 100
>>> print (lasttwodigits)
91
>>> lastonedigit = 123491 % 10
>>> print (lastonedigit)
1
```

Boolean expressions

- A boolean expression is an expression that is either true or false.

x == y	x is equal to y
x != y	x is not equal to y
x > y	x is greater than y
x < y	x is less than y
x >= y	x is greater than or equal to y
x <= y	x is less than or equal to y

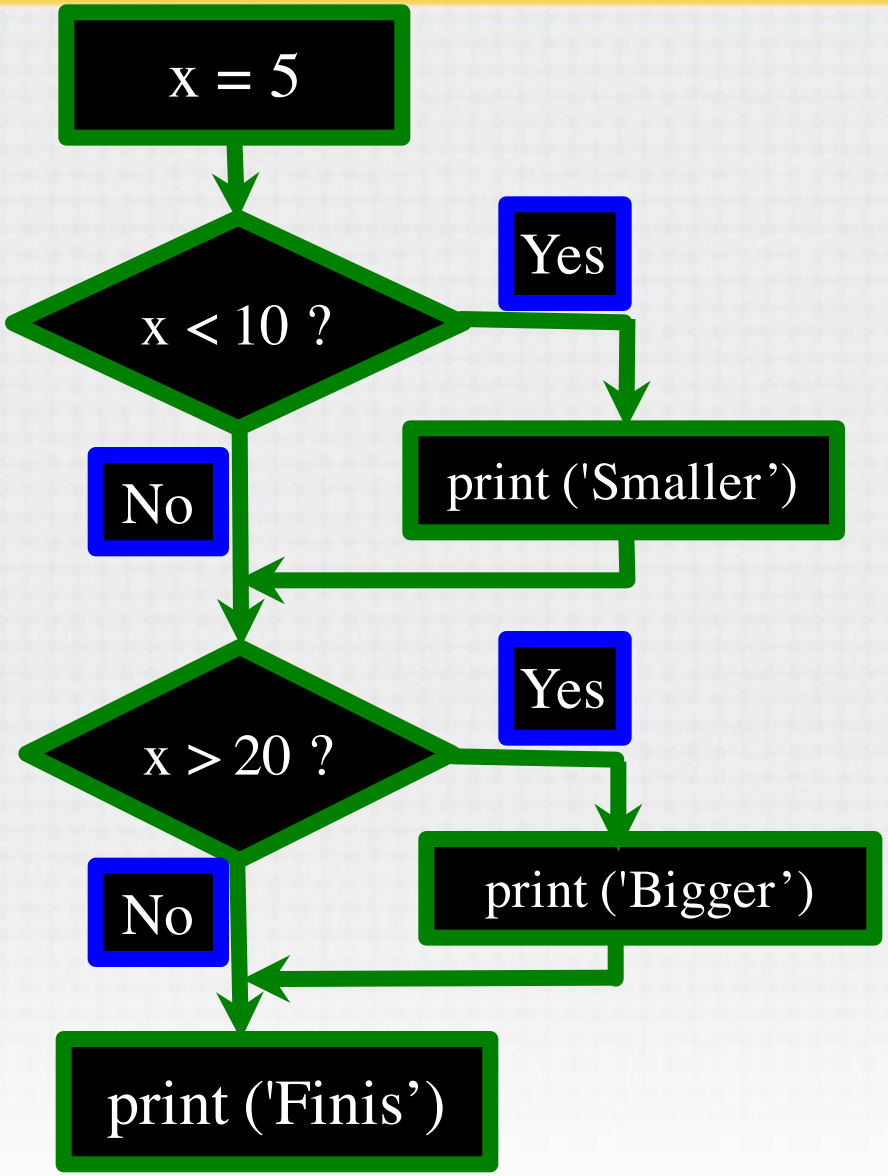
```
>>> x = 5
>>> y = 7
>>> x >= y
False
```

Logical operators

- There are three logical operators: *and*, *or*, and *not*.
  - *and* expression is true if and only if both operands are true
  - *or* expression is true if either one of operands is true
  - *not*: reverse the value

```
>>> x = 5
>>> y = 7
>>> x+y>10 and x-y<0
True
>>> x+y>10 or x-y<0
True
>>> not (x+y>10)
False
```

Conditional execution

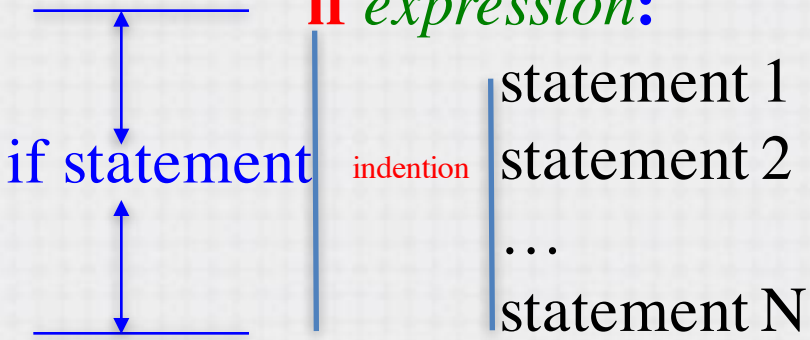



```
Program:

x = 5
if x < 10:
   print ('Smaller')

if x > 20:
    print ('Bigger')

print ('Finis')
```

```
Output:

Smaller
Finis
```

If statement

- Syntax:



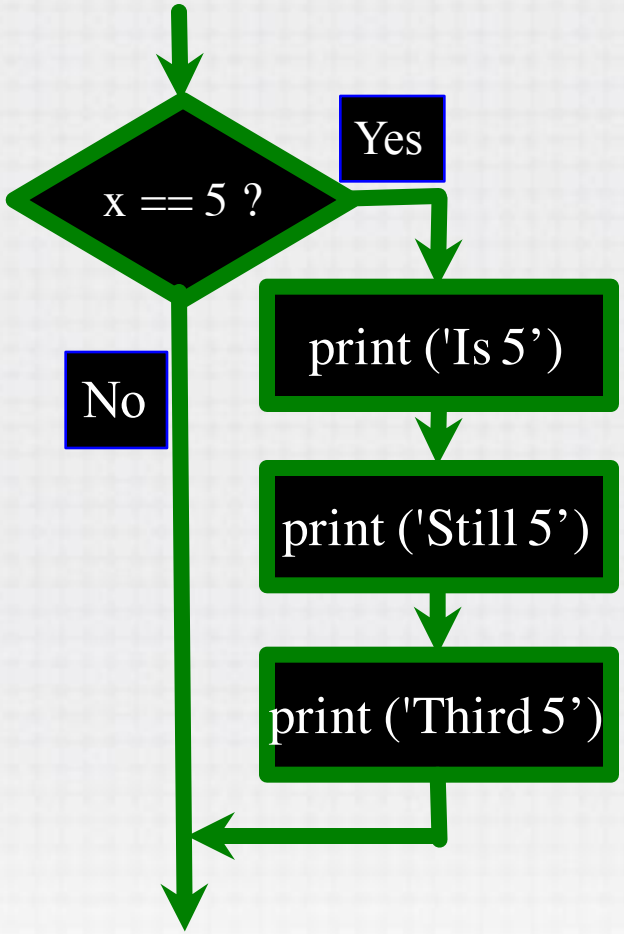
- If the expression is true, statements within the if statement body will be executed, otherwise the entire "if statement" will be ignored

```
>>> x = 5
>>> y = 7
>>> if x+y > 10:
...     print ("sum > 10")
sum > 10
```

If statement

```
x = 5
print 'Before 5'
if  x == 5 :
    print ('Is 5')
    print ('Is Still 5')
    print ('Third 5')
print 'Afterwards 5'
print 'Before 6'
if x == 6 :
    print ('Is 6')
    print ('Is Still 6')
    print ('Third 6')
print 'Afterwards 6'
```

```
Before 5
Is 5
Is Still 5
Third 5
Afterwards 5
Before 6
Afterwards 6
```

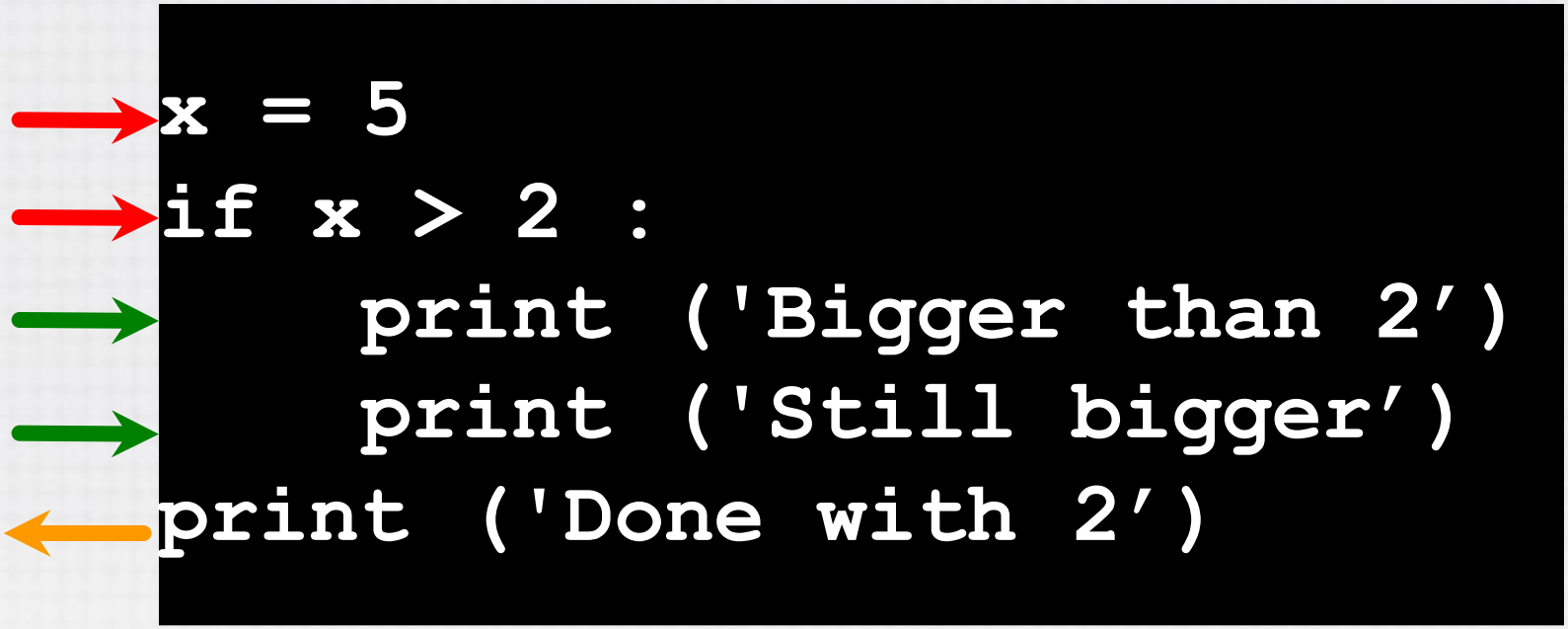


Indention

- Increase indent indent after an if statement (after :)
- Maintain indent to indicate the scope of the block (which lines are affected by the if)
- Reduce indent *back to* the level of the if statement to indicate the end of the block
- Blank lines are ignored - they do not affect indentation
- Comments on a line by themselves are ignored with regard to indentation

Indention

- Increase / maintain after if
- Decrease to indicate end of block



```
x = 5
if x > 2 :
    print ('Bigger than 2')
    print ('Still bigger')
print ('Done with 2')
```

Think about begin/end blocks

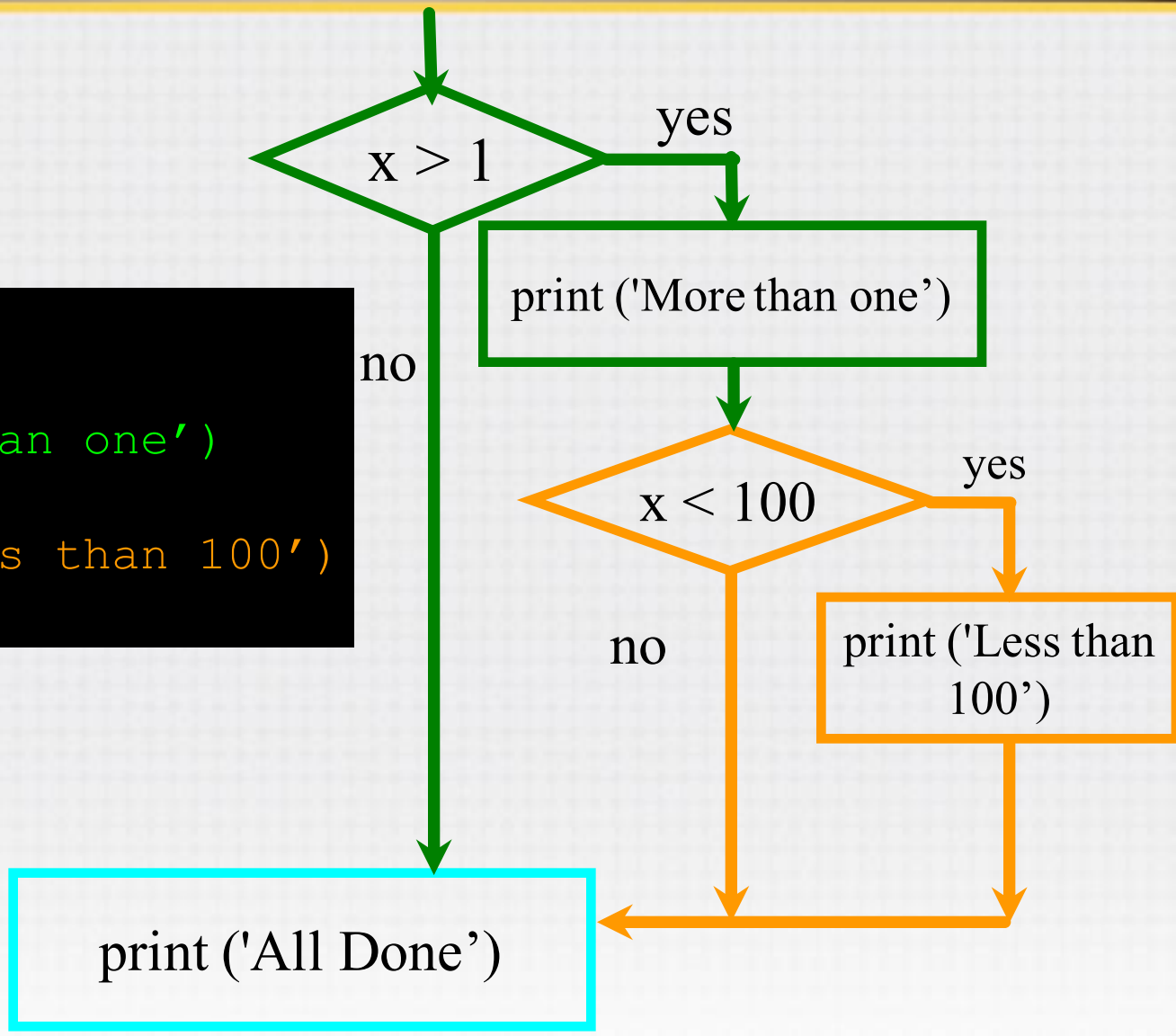
UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

```
x = 5
if x > 2 :
    print('Bigger than 2')
    print('Still bigger')
print ('Done with 2')
```

Nested if-statements

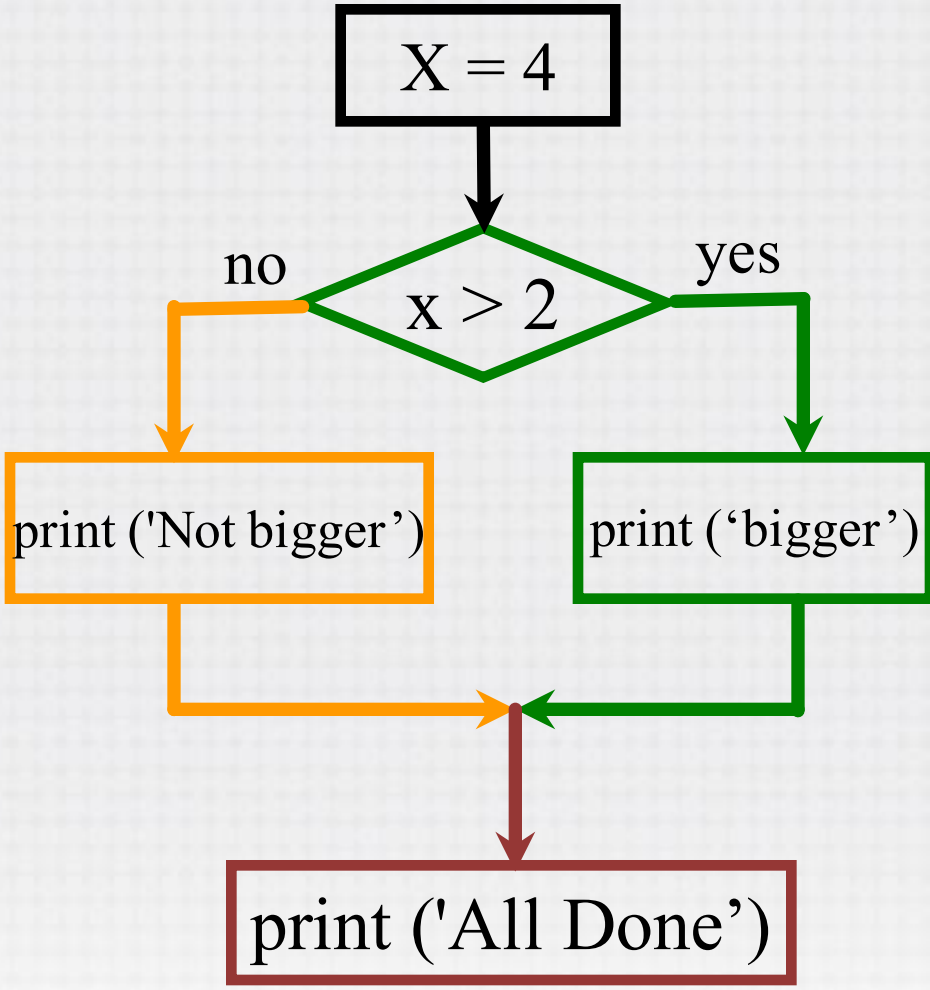
UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

```
x = 42
if x > 1 :
    print ('More than one')
    if x < 100 :
        print ('Less than 100')
print ('All done')
```



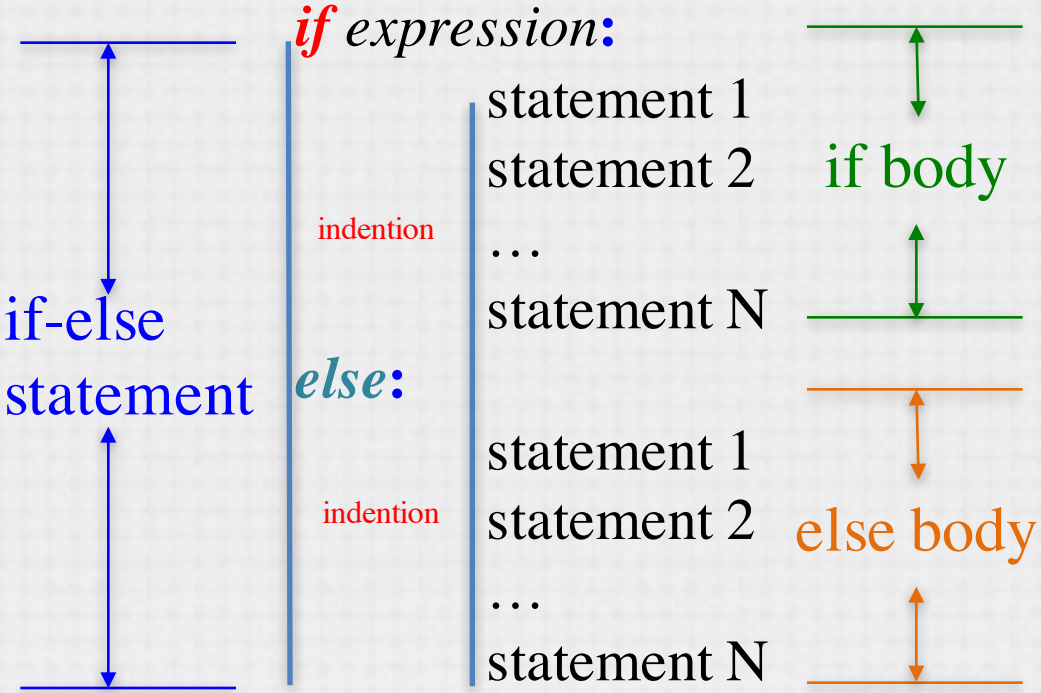
if-else statement

- Sometimes we want to do one thing if a logical expression is true and something else if the expression is false.
- It is like a fork in the road – we must choose one or the other path but not both



if-else statement

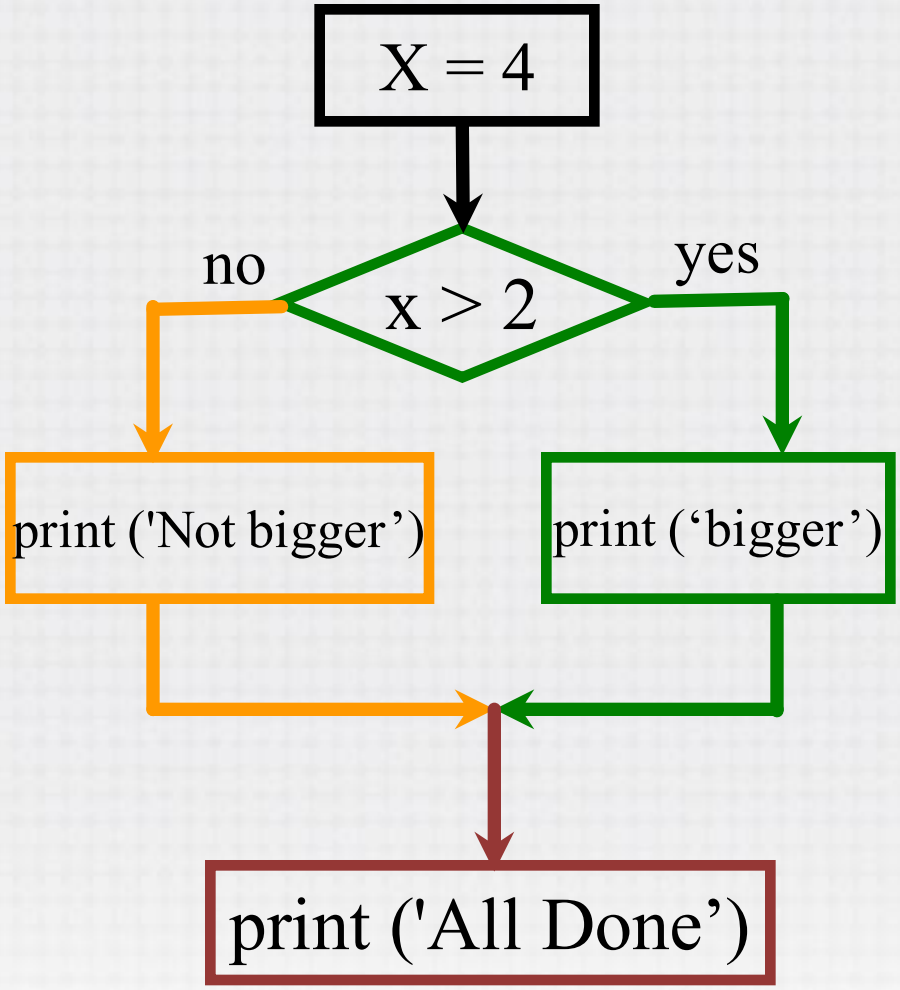
- Syntax:



- If the expression is true, statements within the if statement body will be executed, otherwise statements within else body will be executed.

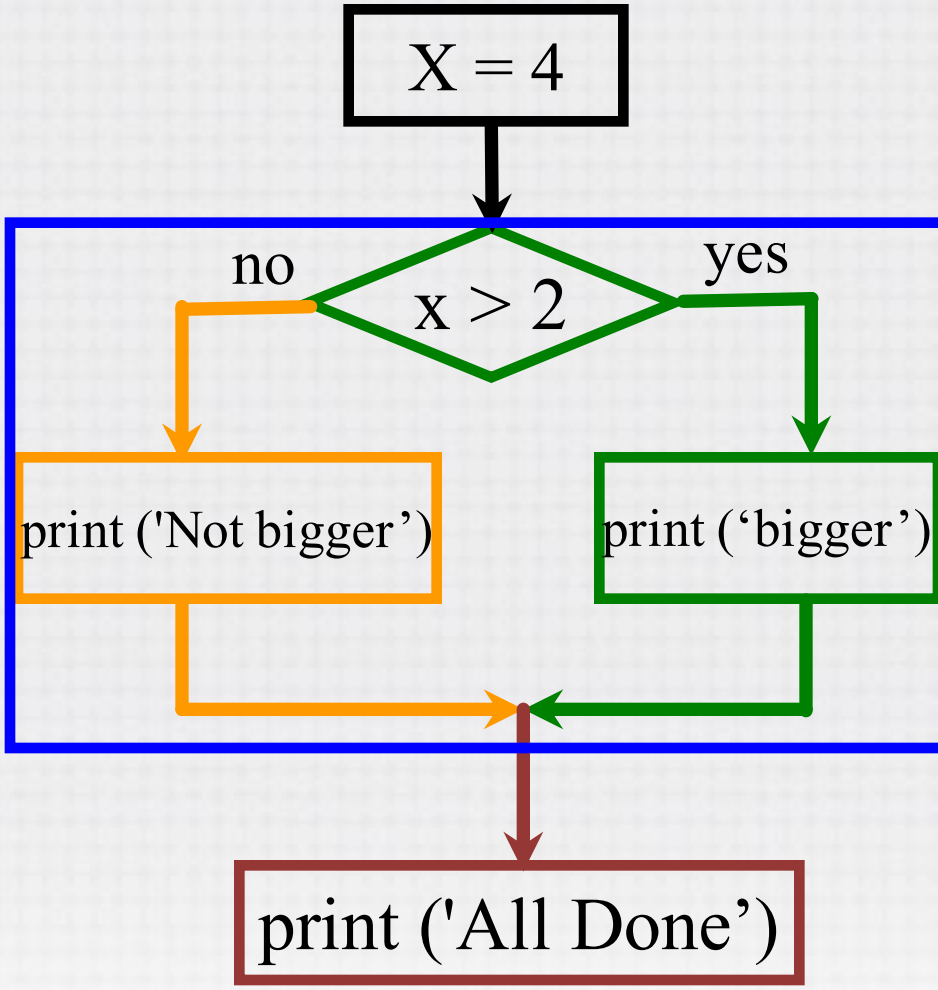
if-else statement

```
x = 4

if x > 2 :
    print('Bigger')
else :
    print('Smaller')

print('All done')
```

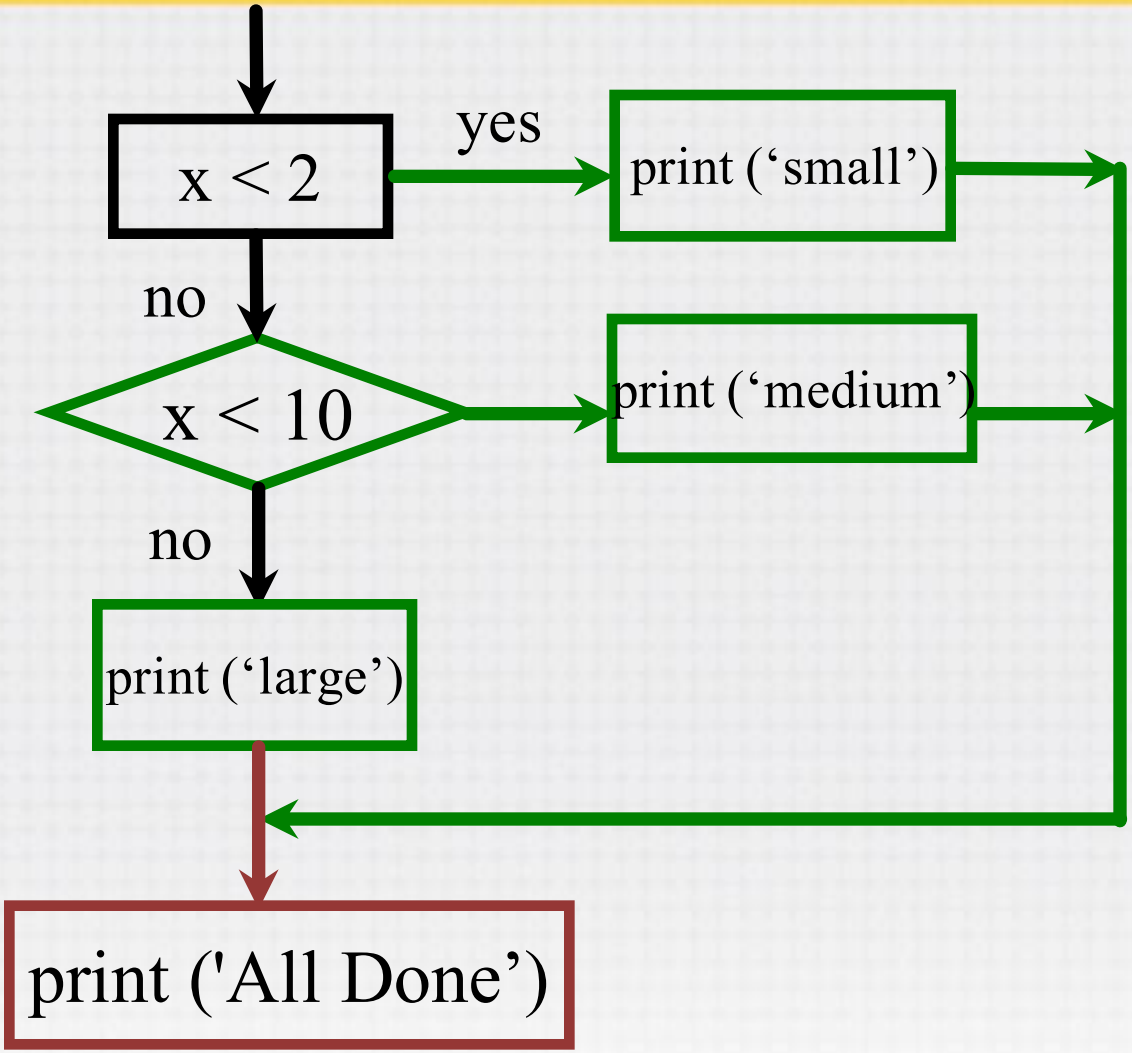


if-else statement

```
x = 4

if x > 2 :
    print('Bigger')
else :
    print('Smaller')

print ('All done')
```



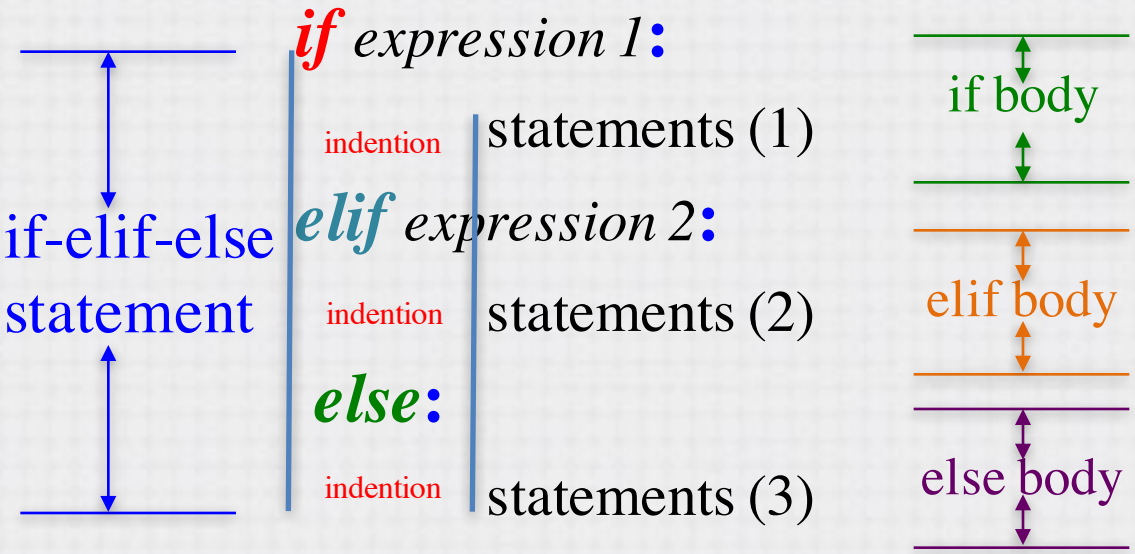
Multi-way


x < 2
yes
print (‘small’)
no
x < 10
print (‘medium’)
no
print (‘large’)
print ('All Done’)

if-elif-else statement

UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

- Syntax:



- If the expression 1 is true, statements (1) within the if statement body will be executed, otherwise if expression 2 is true, statements (2) within elif body will be executed, otherwise, statements (3) within else body will be executed.

Variations (1)

UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

- Syntax:

if expression 1:
    statements (1)
elif expression 2:
    statements (2)
statements after if-elif

```
# No Else
x = 5
if x < 2 :
    print ('Small')
elif x < 10 :
    print ('Medium')

print ('All done')
```

Variations (2)

UNIVERSITY OF MARYLAND
ROBERT H. SMITH SCHOOL OF BUSINESS

- Syntax:

if expression 1:
    statements (1)
elif expression 2:
    statements (2)
elif expression 3:
    statements (3)
…
else:
    statements (N)

```
if x < 2 :
    print ('Small')
elif x < 10 :
    print ('Medium')
elif x < 20 :
    print ('Big')
elif x < 40 :
    print ('Large')
elif x < 100:
    print ('Huge')
else :
    print ('Ginormous')
```

Puzzles

- Which will never print?

```
if x < 2 :
    print('Below 2')
elif x >= 2 :
    print('Two or more')
else :
    print('Something else')
```

```
if x < 2 :
    print('Below 2')
elif x < 20 :
    print('Below 20')
elif x < 10 :
    print('Below 10')
else :
    print('Something
else')
```

Nested cases

- All statements in the body of ***if***, ***elif***, and ***else*** can also be conditional statements.

```
if x < 2 :
    print('Small')
elif x < 10 :
    print('Medium')
elif x < 20 :
    print('Big')
elif x < 100:
    print('Huge')
else :
    print('Ginormous')
```

```
if x < 100 :
   if x < 20 :
      if x < 10 :
         print('Small')
      else:
         print('Big')
   else:
      print('Huge')
else :
    print('Ginormous')
```

Nested cases

- All statements in the body of ***if***, ***elif***, and ***else*** can also be conditional statements.

```
if x < 2 :
    print('Small')
elif x < 10 :
    print('Medium')
elif x < 20 :
    print('Big')
elif x < 100:
    print('Huge')
else :
    print('Ginormous')
```

```
if x < 2 :
    print('Small')
else:
   if x < 10 :
      print('Medium')
   elif x < 20 :
      print('Big')
   elif x < 100:
      print('Huge')
   else :
      print('Ginormous')
```