CIS 122

Logical Conditioning

Homework Note

- Last week, your code *did* something when you ran it
  - Printed out an info sheet
  - Printed out some skittle counts

- This week's homework is more passive
  - Less printing
  - More defining

- It's ok if nothing happens when you run your code
  - Check your definitions in the shell
  - Test your functions in the shell

Functions so far

- Take values as input
- Perform a set of operations
    - Assignments
    - Other function calls
- Return some value as output

Functions so far

- Currently, functions always follow the same steps

- Great if we want to treat every input the same way
    - addOne - Given a number, return its successor
    - Temperature Conversion

- But what if we want different things in different situations?
    - abs - Given a number, return its absolute value
    - longer - Given two strings, return the longer one

Conditional Logic

- We'd like to allow our programs to branch

```
if <something is true>:
    <do one thing>

else:
    <do something else>
```

- But what is truth?
    - We need a new object type

Booleans

- A very simple object type

- Most types have infinitely many values
  - Booleans only have two
  - True / False

Comparisons

- We produce booleans when we compare objects
    - a > b - greater than
    - a < b - less than
    - a >= b - greater than or equal to
    - a <= b - less than or equal to
    - a == b - equal to
    - a != b - not equal to

Comparisons

- Note, the equality operator is ==
    - = was already taken for assignment
    - When you compare values, make sure to use ==
    - Strange things will happen otherwise

```
>>> a = 5
```

Assigns the value 5 to the variable a

```
>>> a == 5
```

Returns True if a holds the value 5, False otherwise

Comparisons

- Any two objects can be compared to return a boolean
  - 1 > 2
  - 3.5 <= 8.0
  - 'a' == 'b'
  - True != False
- We can even compare multiple objects simultaneously
  - 1 < x < 5
- Which is greater, True or False?

Conditional Logic

- What can we do with booleans?
  - Branch!

- The if keyword runs code only if some condition is true
  - Always followed by a boolean condition

```
if x == 0:
    print "x is zero"
```

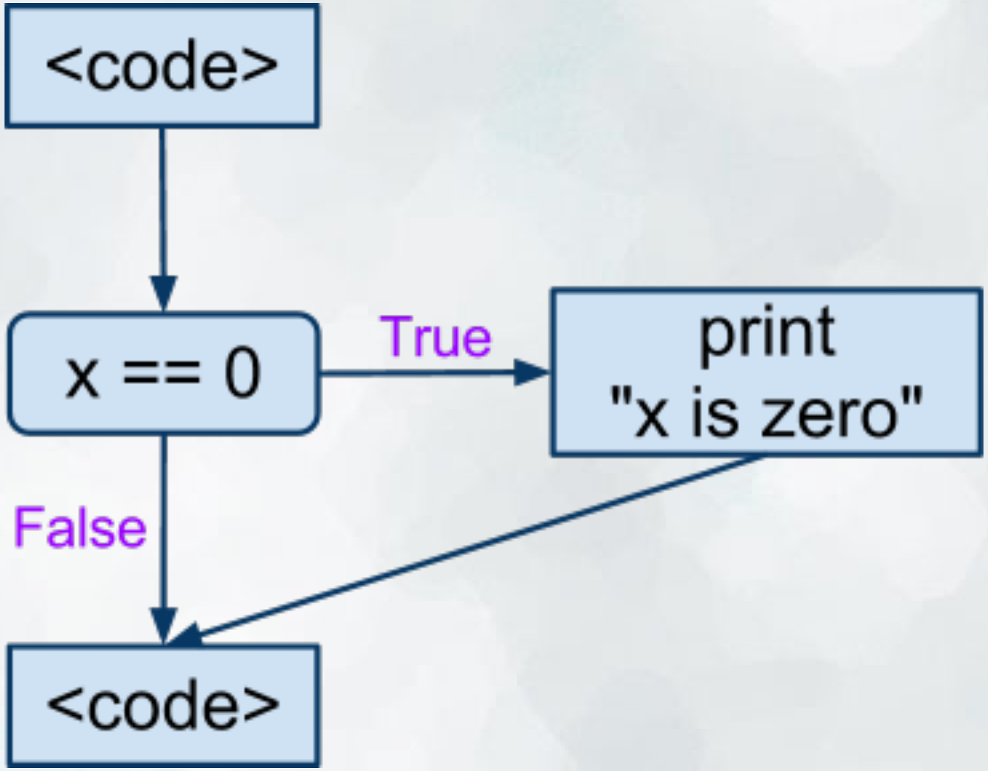
- Note the colon
  - About to define a block of code
  - Indented text

Conditional Logic

```
<code>

if x == 0:
    print "x is zero"

<code>
```



Conditional Logic

- The else keyword runs code if a condition is false
  - Always paired with an if
  - Not followed by a condition

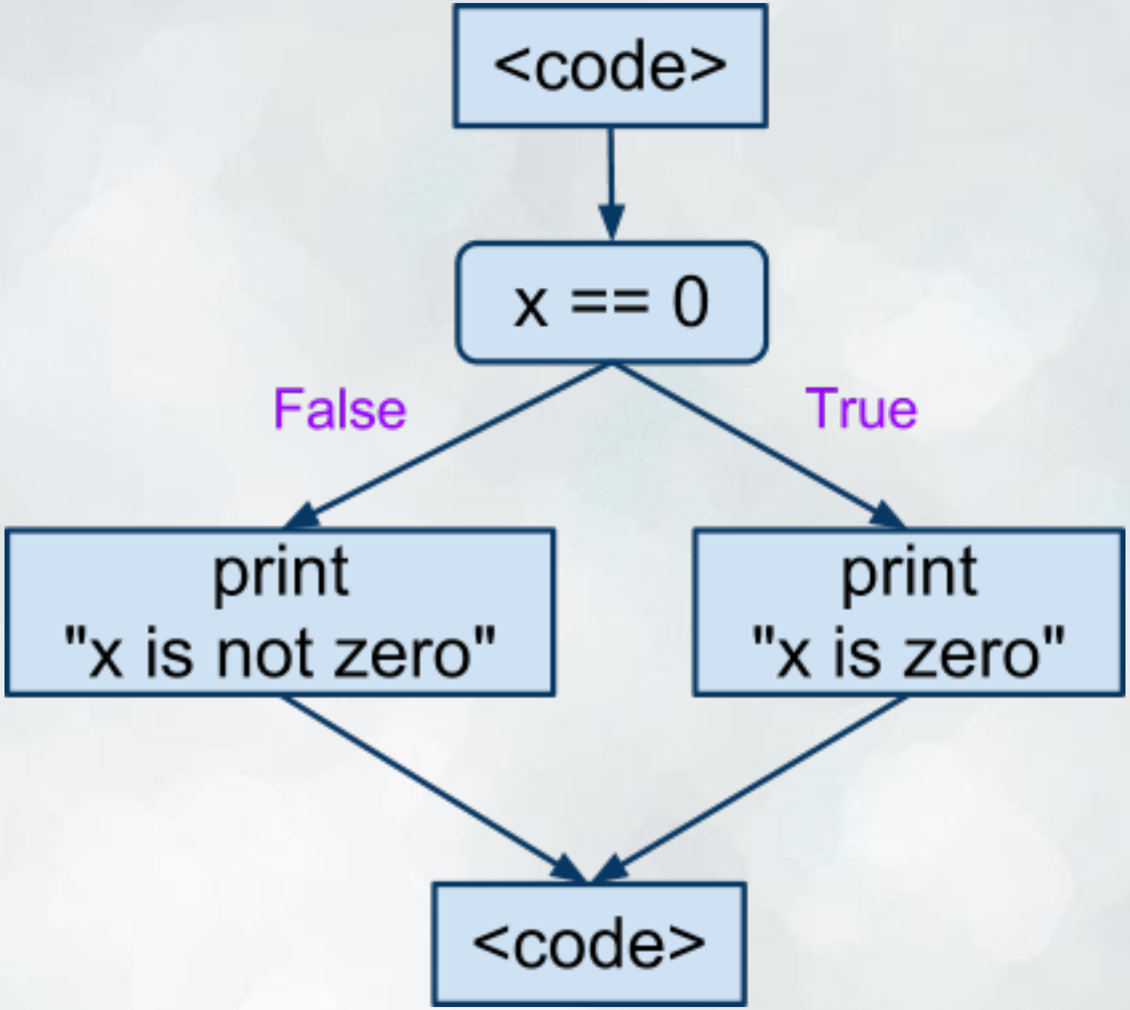
```
if x == 0:
    print "x is zero"
else:
    print "x is not zero"
```

Conditional Logic

```
<code>

if x == 0:
    print "x is zero"
else:
    print "x is not zero"

<code>
```



Conditional Logic

- What if we want to choose between multiple conditions?
    - We could nest if statements...

```
if x == 0:
    print "x is zero"
else:
    if x == 1:
        print "x is one"
    else:
        if x == 2:
            print "x is two"
        else:
            print "beats me"
```

Conditional Logic

- Python provides a shortcut for nesting if statements
    - The elif keyword acts as a combined else and if

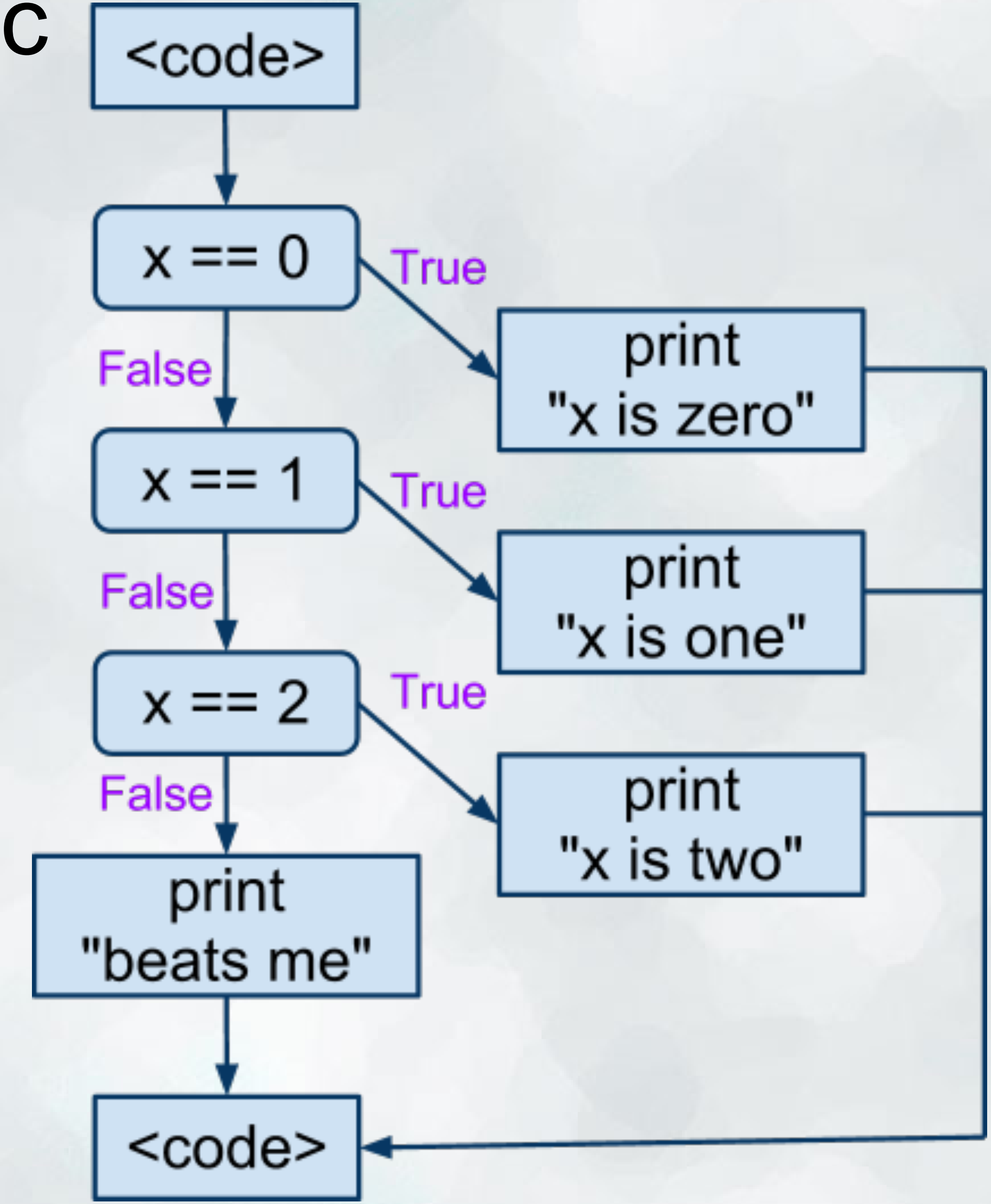
```
if x == 0:
    print "x is zero"
elif x == 1:
    print "x is one"
elif x == 2:
    print "x is two"
else:
    print "beats me"
```

Conditional Logic

```
<code>

if x == 0:
    print "x is zero"
elif x == 1:
    print "x is one"
elif x == 2:
    print "x is two"
else:
    print "beats me"

<code>
```



<code>
x == 0
True
False
print "x is zero"
x == 1
True
False
print "x is one"
x == 2
True
False
print "x is two"
print "beats me"
<code>