

## Objectives

- Brief Conditional Review
- While Loops
- Random Numbers
- Strings

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## Conditional Review

- Logical operators: **and**, **or**, and **not**
- For numeric grade conversion:  
if `num_grade < 0` or `num_grade > 100`:  
print error message  
else:  
computation
- Alternatively:  
if `not( num_grade < 0 or num_grade > 100)`:  
computation  
else:  
print error message

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## Indefinite Loops

- **for** loops are **definite** loops
  - Execute a fixed number of times
- Indefinite loops: keeps iterating until certain conditions are met
  - Depending on condition, no guarantee in advance of how many times the loop body will be executed

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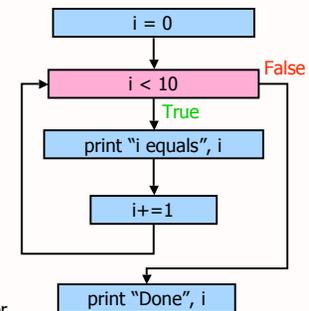
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## While Loop

```
i = 0
while i < 10 :
    print "i equals ", i
    i += 1
print "Done", i
```

### Questions:

- How many times will "i" get printed out?
- How many times is the condition evaluated?
- What is the value of i after the loop?



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whilevsfor.py

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## Unknown Number of Iterations

- Sums numbers input by user
  - Stop when the user inputs some designated stop value (Enter --> "")

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sumtillzero.py

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## Design Pattern: Sentinel Loop

- Sentinel: when to stop
  - "guard" to the loop

```
value = get input
while value != sentinel :
    process value
    value = get input
```

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## Question

- How can we make sure that the loop actually stops (is not infinite)?

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## Question

- How can we make sure that the loop actually stops (is not infinite)?
  1. Update the condition's variable inside loop
  2. Test

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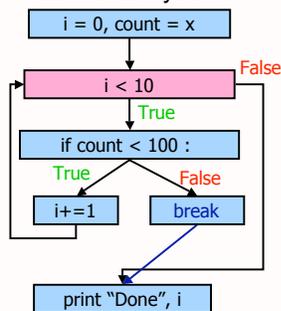
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## Use of `break` statement

- `break` statement can “break you” out of a loop

```
i=0
count = x
while i < 10 :
    if count < 100 :
        i += 1
    else:
        break
print "Done", i
```



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## While Loops, comparing use of `break`

```
/* condition shows when loop
will stop executing */
x= input("Enter a number")
while x % 2 != 0 :
    x = input("Try again. Enter
a number")
print x, " is an even number."
```

```
/* have to look inside loop to
know when it stops */
while True :
    x = input("Enter a number")
    if x % 2 == 0 :
        break
print x, " is an even number."
```

Using `break` statements:  
Best when loop has to  
execute at least once.

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## While vs. For Loops

- Any `for` loop can be translated into a `while` loop
  - Not vice versa
- `while` loops are more powerful than `for` loops

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## Summary of Building Blocks

- Conditional statements
  - if, if-else, if-else-if
- Loops
  - while, for

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## Nondeterministic Decisions

- Sometimes, we don't want to necessarily know that a specific decision is always made
- For example, games often use randomness to make decisions
  - Roll dice
  - Coin flips
  - Location and behavior of baddies

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## random module

- Python provides the **random** module to generate pseudo-random numbers
- Why "pseudo-random"?
  - Actually generates a list of numbers and grabs the next one off the list
  - A "seed" is used to initialize the random number generator
    - By default, the current time is used

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## Some random Functions

- `random()`
  - Returns the next random floating point number in the range [0.0, 1.0)
- `randint(a, b)`
  - Return a random integer N such that  $a \leq N \leq b$

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[random\\_test.py](#)

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## Simulate Flipping Coins

- Simulate by randomly selecting between 0 (heads) and 1 (tails)
- Program: `coinFlip.py`
- Problem: How many flips does it take to get 3 consecutive heads?

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[consecutiveHeads.py](#)

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## October Problem of the Month

- Twelve W&L alumni get together during homecoming to have lunch. Before they sit down to eat, everyone shakes hands with everyone else exactly once. How many handshakes take place?

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[shake\\_hands.py](#)

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## Broader CS Issues

- Environmental Monitoring with Sensor Networks
  - See [blog entry](#) for links, more info

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