

## Objectives

- Indefinite Loop
- Broader Issue: Computer Science Education

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## Review

- How do you create a module?
  - What are the benefits of putting functions in modules?
- How can you make a function have a default value for a parameter?
- What is the structure we use to handle exceptions?

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## INDEFINITE LOOPS

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## Indefinite Loops

- **for** loops are *definite* loops
  - Execute a *fixed* number of times
- *Indefinite* loops: keep 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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## While Loop Syntax

```
while condition :  
    statement1  
    statement2  
    ...  
    statementn
```

loop stops when condition is False

body of while loop

keyword

- Like a looped **if** statement
  - Execute statements **only** when condition is true

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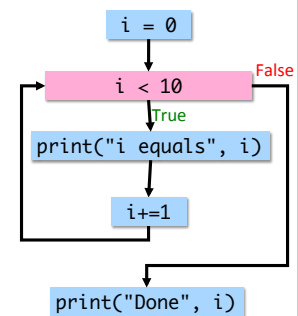
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## While Loop

```
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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while.py

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### While Loop

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

Initialize i before using in condition

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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### While vs. For Loops

- Any **for** loop can be translated into a **while** loop
  - But **NOT** vice versa
- **while** loops are more **powerful** than **for** loops

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### Convert to a for loop

We can convert this **while** loop into a **for** loop because it executes a **fixed** number of times.

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

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### Comparing while and for

- What are the main differences between these loops?
- What are the advantages and disadvantages of each?

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

```
for i in range(10):
    print("i equals", i)
    print("Done", i+1)
```

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### What Will This Loop Do?

```
count = 1
while count > 0:
    print(count)
    count += 1
```

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### Infinite Loop

- Condition will never be **False** so keeps executing

```
count = 1
while count > 0:
    print(count)
    count += 1
```

- To stop an executing program in Linux use
  - Control-C

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## Infinite Loop Discussion

- Is there ever a time that an infinite loop is wanted?
  - Yes! For example in web servers, we have something like
- Can a computer automatically detect infinite loops?
  - No that is an **undecidable** problem
  - Best to **prevent** infinite loops (more later)
    - Benefit of Python's **for** loops: definite loops

```
while True:
    listenForRequest()
    handleRequest()
```

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## A Very Simple Therapist

- Whenever a user tells the computer/program what they think, the program asks, "How does that make you feel?"
- Ends when user enters nothing ("")
- Partial example output:

```
Tell me what is bothering you.
There is too much going on in my life.
How does that make you feel?
I feel like I am out of control and can't juggle it all.
How does that make you feel?
Really stressed and tired.
How does that make you feel?
Thank you! Come again!
```

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therapist.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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## Another Way to Read from a File

```
FILENAME="data/years.dat"
dataFile = open(FILENAME, "r")
line = dataFile.readline()
while line != "":
    line = line.rstrip()
    print(line)
    line = dataFile.readline()
dataFile.close()
```

file\_read\_while.py

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## while Loops: comparing use of break

```
# condition says when loop
# will continue
x=eval(input("Enter number:"))
while x % 2 != 0 :
    print("Error!")
    x = eval(input("Try
again: "))
print(x, "is an even number.")

# have to look inside loop to
# know when it stops
while True :
    x = eval(input("Enter number:"))
    if x % 2 == 0 :
        break "breaks" out of a loop
    print("Error!")
print(x, "is an even number.")
```

Says when to keep going

Says when to stop

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

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## Flipping Coins

- Problem: How many flips does it take to get 3 consecutive heads?

consecutiveHeads.py

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## Summary: While vs. For Loops

- Any **for** loop can be translated into a **while** loop
  - But **not** vice versa
- **while** loops are more **powerful** than **for** loops
  - Give an example of a **while** loop that can't be converted to a **for**

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## Broader Issue Groups

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## Computer Science Education

- Who should be interested in computer science education?
- When should computer science be taught?
  - What are the tradeoffs?
  - What forms can it take?
- Is Computer Science an acceptable replacement for foreign language?
  - If not foreign language, where does it fit?
- What are the effects of encouraging more computer science education?

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## Computer Science Education

- How many of your high schools offered
  - Computing courses?
  - AP Computer Science?
- How many of you would recommend computer science to a friend?

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## Discussion

- Tradeoffs: Computer science education
  - Availability of Resources – computers, qualified teachers
  - Students' ability to learn
    - Some people's brains don't develop their ability to think abstractly until their mid 20's
- Discussion of internal incentives

article acts as incentive "... for class members who are excelling [at computer science] to stick with it"

  - Don't let the struggle bring you down.
  - Keep working, trying, failing, and ultimately succeeding!

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