While loops

Concept Question

```
def hasVowels(word):
    if type(word) == str:
        for letter in word:
            if letter in 'aeiou':
                return True
    else:
        return False
```

What is the return value of hasVowels("banana")?

A. True
B. False
C. None

Concep Question

```
def hasVowels(word):
    if type(word) == str:
        for letter in word:
            if letter in 'aeiou':
                return True
    else:
        return False
```

What is the return value for hasVowels("")?

A. True

B. False

C. None

If word is an empty string, the code inside the for loop does not run even once.
Since there is no return statement after the for loop, function returns None

Motivating While Loops

- So far, we know about one type of loop: `for` loop
  - It requires a sequence (e.g. a `range` sequence or a string) to loop over
- Another type of loop is the `while` loop: it repeatedly tests a condition, executing the entire body of the loop if it is True, and terminating the loop if it is False
  - Useful when there is no sequence to loop over
  - Commonly used when we don't know how many times the loop will run

ConcepTest

What is printed by the following code? (Output is on one line to save space.)

```
x = 6
while x > 4:
  print(x)
  x = x - 1
```

- A. 6 5
- B. 6 5 4
- C. 5 4
- D. 5 4 3
- E. 6 5 4 3

ConcepTest

What is printed by the following code? (Output is on one line to save space.)

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- A. 6 5
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- D. 5 4 3
- E. 6 5 4 3

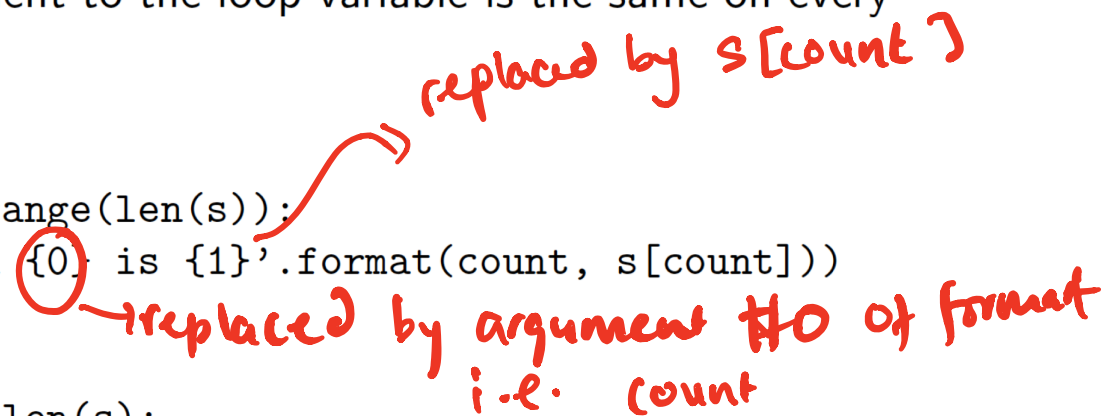
For vs. While

Use `for` when:

- You want to loop through an entire sequence without stopping
- The number of iterations does not depend on user input
- The increment to the loop variable is the same on every iteration

```
s = 'abc'
for count in range(len(s)):
  print('Index {0} is {1}'.format(count, s[count]))

count = 0
while count < len(s):
  print('Index {0} is {1}'.format(count, s[count]))
  count += 1
```



ConcepTest

```
valid = False
while not valid:
  s = input ("Enter a password: ")
  valid = len(s) == 5 and s[:2] == 'xy'
```

Which of the following passwords gets us out of the loop?

- A. xyz
- B. abcxy
- C. xyabc
- D. More than one of the above passwords get us out of the loop
- E. None; the loop never executes and no passwords are obtained

True and break

- There are several ways to write a loop whose body is required to run at least once
  1. Artificially make the condition true before the loop starts (like `inputloop.py`)
  2. Copy some loop code above the loop to make the condition true
  3. Use `True` as the condition and `break` to exit the loop
- `break` causes immediate termination of the loop
- `break` can make code difficult to read if used improperly
- We frequently do not allow `break` on exams or assignments

ConcepTest

A valid password is one that is length 5 and starts with `xy`. Such passwords should get us out of the loop. Which of these does this?

- A.

```
while True:
  s = input ("Enter a password: ")
  if len(s) == 5 and s[:2] == 'xy':
    break
```

- B.

```
s = input ("Enter a password: ")
while len(s) == 5 and s[:2] == 'xy':
  s = input ("Enter a password: ")
```

← Does the opposite

- C. Both are correct
- D. None is correct

ConcepTest

What is the output of this code? (Output is on one line here to save space.)

```
n = 3
while n > 0:
  if n == 5:
    n = -99
  print(n)
  n = n + 1
```

n

3 4 -99

- A. 3 4
- B. 3 4 5
- C. 3 4 -99
- D. 3 4 5 -99