While Loops

Announcements

• Program 4 assigned - due Sunday, October 1st by 11:55pm

Introduction to Repetition Structures

```
x = 1
if x < 10:
    x = x + 1
    print(x)
if x < 10:
    print(x)
if x < 10:
    print(x)
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    print(x)
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    print(x)
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    print(x)
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    print(x)
if x < 10:
    print(x)
```  

If your code starts to look like this, you probably want to think about using a loop instead!

What's a loop???

The while Loop

```
while __test__:
    statement
    more statements...
    statement
    statement
    more statements...
```  

The test must be something that is True or False.

The indented statements are called the body of the loop.
The while Loop

- In order for a loop to stop executing, something has to happen inside the loop to make the condition false
- **Iteration**: one execution of the body of a loop
- **while** loop is known as a **pretest** loop
  - Tests condition before performing an iteration
  - Will never execute if condition is false to start with
  - Requires performing some steps prior to the loop

A Common Use of a Loop

Count the number of times something happens

```python
# Set up a variable to count
cnt = 0
while cnt < 10:
    # Do something here
    print(cnt)  # An example of a statement
    cnt += 1    # This is equivalent to cnt = cnt + 1

# Set up a variable to count, want to count by fives this time

cnt = 5
while cnt < 100:
    # Do something here
    print(cnt)  # An example of a statement
    cnt += 5    # This is equivalent to cnt = cnt + 5
```
**Another Common Use of While Loop**

Ask the user if they want to keep looping

```python
# Set up a variable to manage the loop
keep_going = "yes"
while keep_going == "yes":
    # Put whatever you want to happen
    # multiple times in this space.
    # Ask the user if they want to do it again
    keep_going = input("Do you want to keep going?")
```

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**Infinite Loops**

- Loops must contain within themselves a way to terminate
  - Something inside a `while` loop must eventually make the condition false
- **Infinite loop**: loop that does **not** have a way of stopping
  - Repeats until program is interrupted
  - Occurs when programmer forgets to include stopping code in the loop
Trace that Code

For the following input, what is the value of temp?
4728459113-1

def main():
    input1 = int(input("Please enter an integer: "))
    temp = 0
    while(len(input1) > 0):
        temp = temp + input1
        input1 = int(input("Please enter another integer: "))
    print("Temp: ", temp)
main()

Trace that Code

For the following input, what is the value of temp?
4386192-1

def main():
    input1 = int(input("Please enter an integer: "))
    temp = 0
    while(len(input1) > 0):
        temp = temp + input1
        input1 = int(input("Please enter another integer: "))
    print("Temp: ", temp)
main()

Calling Functions in a Loop

• Functions can be called from statements in the body of a loop
  – Often improves the design
  – Example:
    • Write a function to calculate then display the commission for a sales amount
    • Call the function inside a loop
This program calculates sales commissions.

```c
int main()
{
    // Create a variable to control the loop.
    keep_going = 'y';

    // Calculate a series of commissions.
    while (keep_going == 'y')
    {
        // Call the show_commission function to
        // display a salesperson's commission.
        show_commission();

        // See if the user wants to do another one.
        keep_going = input("Do you want to calculate another 'y' \n        commission (Enter 'y' for yes): ");
    }

    // The show_commission function gets the amount of
    // sales and the commission rate, and then displays
    // the amount of commission.
    show_commission();

    // Get a salesperson's sales and commission rate.
    sales = float(input("Enter the amount of sales: ");)
    com_rate = float(input("Enter the commission rate: ");)

    // Calculate the commission.
    commission = sales * com_rate;

    // Display the commission.
    printf("The commission is ", 
        format(commission, ",.2f"));

    // Call the main function.
    main();
}  // main()
```