Announcements

- MPL Assignment 3 due Sun, Sept. 28\textsuperscript{th} by 11:59pm
- Program 3 due Mon, Sept. 29\textsuperscript{th} by 11:55pm

- Reminders
  - No class on Monday, September 22\textsuperscript{nd}
  - No office hours on Monday, Sept. 22 or Tuesday, Sept. 23.

Introduction to Repetition Structures

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

```python
n = 1
if n < 10:
    n += 1
    print(n)
if n < 10:
    n += 1
    print(n)
if n < 10:
    n += 1
    print(n)
if n < 10:
    n += 1
    print(n)
```

What’s a loop???

The while Loop

```python
while \texttt{test}:
    statement
    more statements...
    statement
    more statements...
```
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?")
```

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

```python
# This program calculates sales commissions.
def main():
    # Create a variable to control the loop.
    keep_going = 'y'
    # Calculate a series of commissions.
    while keep_going == 'y':
        # Get a salesperson's sales and commission rate.
        sales = float(input('Enter the amount of sales: '))
        comm_rate = float(input('Enter the commission rate: '))
        # Calculate the commission.
        commission = sales * comm_rate
        # Display the commission.
        print('The commission is $',
              format(commision, '.2f'), sep='')
        # Set if the user wants to do another one.
        keep_going = input('Do you want to calculate another? y: '
                            'n: ')
    # Call the main function.
    main()
```
Trace that Code

For the following input, what is the value of temp?
4 3 8 6 1 9 2 -1

```python
def main():
    input1 = int(input("Please enter an integer: "))
    temp = 0
    while(input1 > 0):
        temp *= 1
        input1 = int(input("Please enter another integer: "))
    print("Temp: ", temp)

main()
```

Trace that Code

For the following input, what is the value of temp?
4 7 2 8 4 5 9 1 1 3 -1

```python
def main():
    input1 = int(input("Please enter an integer: "))
    temp = 0
    while(input1 > 0):
        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

![Flowchart for the main and show_commission functions](image)
**Class Exercise**

- Write a program that takes as input the weight (in ounces) of a package and calculates the required postage amount to mail it. Allow the user to continue to calculate postage for as long as they'd like.

- Assume the total postage is calculated as follows:
  - A flat rate of $.90 plus $.20 for every ounce over 1

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**Loop Practice**

Write a *while loop* that will compute the sum of the first $n$ positive odd numbers. For example, if $n$ is 5, you should compute $1 + 3 + 5 + 7 + 9$.

- Work in groups, do this on paper
- Hand in paper with names on it