Lesson Four

Math 6080 (for the Masters Teaching Program), Summer 2020

Part 1. While Loops. In contrast to the "if x:" Python command, which performs the Python task following the colon if x is true and then stops, the Python command "while x:" performs the Python task following the colon if x is true and then **returns** to the "while x:" to run it again (if x remains true). Thus:

```
x = 1
if x == 1:
    print('one')
```

will print one and then stop. But:

```
x = 1
while x == 1:
    print('one')
```

will print one over and over in an infinite loop (try it).

A "while x:" loop is useful when you change the conditions for x before returning. Thus:

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

will do print the numbers from 1 to 10 and then stop (try it!).

Remark. The command "x = x + 1" is interesting. It re-assigns the variable x to its old value plus one. Python has a shorthand for this: "x += 1" which I intend to never use.

First Exercise. Print lists of the first 20 powers of two, and the first 20 natural numbers followed by their square roots (with a comma in between).

First Big Exercise. Automate the process of finding the gcd of two numbers with a "while" loop. For example, given the numbers from Lesson One write Python code starting with:

```
n = 560014
m = 29652
while m != 0:
    (you fill in the rest).
```

Reference: w3schools.com/python (Python while loops)