

Practice with for loops (Some of these may need if statements, counters, or other variables. For extra help you can always look to google after you tried working through the problem yourself first.)

- for loops are a way for you to repeat your code for a defined amount of repetitions.
- you use these when you know how many times you want some code to repeat

for i in range(1,10): will loop 9 times

-another word for loop is iteration

Example:

Use a for loop to find the sum of the numbers from 0-20.

```
sum = 0                                #this is a counter variable
for i in range(1,20):
    sum += i                            #here the counter is increased by the value of i
print(sum)
```

#sum += i this also can be written as sum = sum + i

Problems:

1. Use a for loop to find the sum of the numbers 1- 10 for the equation x^2 (in python x^2 is written as $x**2$)

- use a counter
- each time you add to your counter, the i value will be squared

2. Use a for loop to find the product of the numbers 1-10

- you will need a counter, but instead of adding you will be multiplying

3. Use a loop to find the product of the numbers 1-10 for the equation $i/(i+1)$ $\rightarrow \frac{i}{(i+1)}$

4. Use a loop to print out the following pattern

```
*
**
***
****
*****
*****
```

5. try out this code and see what happens, draw the picture below

```
for i in range(1,6):
```

```
    print(i*" "+"(10-2*i) * " "+i*" ")    #you might need to edit the "" in jdoodle
```

6. Write a program that will print out all the even numbers between -5 and 10

While Loops: code used for repeating code as many times as needed when you don't know how many iterations you need to find a solution.

- While loops will keep iterating until the condition you give it is satisfied
- While (x< 10) will keep looping until the value of your x variable reaches just before 10

Example:

Consider the summation:

$$\sum_{k=1}^{100} 1/i = 5050$$

This summation equation will add all the terms in this sequence up

A few of the numbers in the sequence are: 1, 1/2, 1/3, 1/4,..... 1/100

Try this code in jdoodle

Side problem: could you figure out how to find the summation for 1/30

```
def func(x):
```

```
    accumulator = 0
```

```
    i = 1
```

```
    while i<= x:
```

```
        accumulator += 1/i
```

```
        i += 1
```

```
    return accumulator
```

```
print(func(10) )
```

```
    #gives you the summation for 1/10
```

You may need to edit the indentation of this code on jdoodle!! Practice Debugging!

1. Use a while loop to keep getting user input until the user gives you the word quit

2. Use a while loop to print out your name 10 times

Functions: functions are a way to structure programs

- A function is a named sequence of statements that performs a computation
- Early programmers realized that you need to repeat certain processes in code multiple times, so they use functions to invoke certain computations in multiple parts of their code (adding or subtracting in a calculator)

Ex:

```
def func(x):  
    eq = x + 5  
    return eq  
func(5)          #the output of this function would be 10  
func(6)          #the output for when I invoke func(6) would be 11  
func(10)         #the output when I call this function with the value 10 would be 15
```

1. Use a function to be able to print out a large letter T but you can do it with different types of keys :

-----	*****	8888888
	*	8
	*	8
	*	8

2. Use a function to find the sum of two numbers

3. Use a function to find the product of two numbers using the equation $x^2 + y^2$