

EXERCISE SOLUTIONS

1. Write a **while** loop that prints the numbers from 1 to 20, as well as their squares, in this format:
1 squared = 1
2 squared = 4
3 squared = 9

```
i = 1
while i < 21:
    print(i,"squared = ",i*i)
    i = i + 1
```

2. Write a **for** loop that counts from 0 to 100 and prints out each number.

```
for i in range(101):
    print(i)
```

3. Write a **while** loop that asks the user to enter a series of positive numbers that will be added. The loop stops accepting input when the user enters a 0. Then print out the sum of those numbers.

```
sum = 0;
in_value = 0;
while in_value != 0:
    in_value = input("Enter a positive number to be added (0 to quit): ")
    if (in_value > 0)
        sum += in_value
    elif (in_value < 0)
        print("Negative numbers aren't allowed")
print("The sum of the positive numbers you entered is: ", sum)
```

4. Write a **for** loop that prints out the numbers 1, 4, 7, 10, 13, ... , 298, 301.

```
for i in range(1, 302, 3):
    print(i)
```

5. Write a **while** loop that prints out the numbers 0, 4, 8, 12, ... , 96, 100.

```
i = 0
while (i <= 100):
    print(i)
    i += 4
```

6. Write an infinite loop that has the user repeatedly enter passwords until he/she enters the correct password, a password of your choosing. Once the password is entered, **break** out of the infinite loop.

```
the_password = "70p53cr37"
while True:
    pw_attempt = input("Password: ")
    if pw_attempt == the_password:
        break
    print("Invalid entry.")
# If we get here, they've entered the correct password!
print("You're in!")
```

7. Write a loop that displays the Fibonacci sequence. The first two numbers in the Fibonacci sequence are 0 and 1. Subsequent numbers are found by adding the previous two numbers, so the sequence begins 0, 1, 1, 2, 3, 5, 8, 13, ...

There are ways to solve this using something called *recursion*, but here we'll just use a loop to solve it. The problem doesn't indicate how many times we should run the loop, and the Fibonacci sequence is infinite, so... I guess this will be an infinite loop that the user will have to manually break out of.

```
first_num = 0
second_num = 1
print("The Fibonacci series (Ctrl-C to quit)");
while True:      # infinite loop!
    print(first_num)
    temp = first_num + second_num
    first_num = second_num
    second_num = temp
```

8. Write a "prime finder" loop that determines whether a given number n is prime or not. Any integer $n > 2$ is prime if no number between 2 and \sqrt{n} (inclusive) evenly divides into n . The loop should return **true** if n is prime and **false** if n is not prime.

```
for i in range(2, int(math.sqrt(n)) + 1):
    # Each time we go through the loop, check to see if the current i divides
    # evenly into the prospective prime n. If it does, we know this number is
    # not prime so we should return false.

    if (n % i == 0):
        return False # it's not a prime

# If we fall out of the loop having not returned false, it must be that none
# of those numbers divided evenly into our prospective prime. Therefore, it
# must be prime and we can return true.

return True          # it IS a prime!
```