DSC 430: Python Programming
Assignment 0301: Goldbach's Conjecture

Goldbach's Conjecture is one of the oldest and best-known unsolved problems in number theory and all of mathematics. It states that every **even** integer greater than 2 can be expressed as the sum of two primes. The conjecture has been shown to hold for all integers less than 4×10^{18}, but remains unproven despite considerable effort.

Test Goldbach's Conjecture on for **all integers less than one hundred**. For each integer, print out a single line showing how two primes can sum to the integer. For example:

4 = 2 + 2
6 = 3 + 3
8 = 3 + 5
…etc.

Remember, 1 is not prime.

Ensure to provide a sufficient amount of documentation/comments in the code. Points of particular importance are:

- Comment for **each loop** (outer, inner, nested – any one loop) what it is iterating over.

Also **write answers to these in a comment section at the end of the code file (REQUIRED)**:

- Explain how you find two primes to sum to the given integer.
- Are you hard-coding prime numbers? If so, how would you extend your code to work with any number (Goldbach's Conjecture on for all even integers less than n)?
- Or if you had written a function to generate prime numbers less than n, or to verify if a number is a prime number, do you think your code is efficient? Are there ways to optimize it?

Submission: Submit the source file (.ipynb) and the exported html file (.html) to the D2L. Do not zip or archive the file. Your code must include comments at the top including your name, assignment number, and the honor statement, "I have not given or received any unauthorized assistance on this assignment." Also, **each function** must include a docstring.

Friendly hints:

- ✓ The first 25 prime numbers (all the prime numbers less than 100) are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97.
- ✓ There are many references online on how to find all prime numbers less than a given value. Here are some of them:
  - https://www.geeksforgeeks.org/print-all-prime-numbers-less-than-or-equal-to-n/
  - https://www.geeksforgeeks.org/sieve-of-eratosthenes/
  - https://stackoverflow.com/questions/15285534/isprime-function-for-python-language