

## Problem N.2

# Goldbach's Other Conjecture

Due Date: 3/20/2019

Folder: NumberTheory

File Name: N2\_Goldbach\_Name.py

Points: 5 points

## Learning Objectives

- Mix of programming skills
- Disprove a conjecture

## Problem Background

There is another famous conjecture in number theory called Goldbach's conjecture. This states that

Every even number greater than 2 can be written as the sum of two primes.

This has baffled some of the greatest mathematicians for almost 300 years. But we will not be considering this conjecture for this problem. Instead we will consider another conjecture by Goldbach:

Every odd composite number can be written as the sum of a prime and twice a square.

So for example,

$$9 = 7 + 2 \times 1^2$$

$$15 = 7 + 2 \times 2^2$$

$$21 = 3 + 2 \times 3^2.$$

This conjecture has since been proven **false**, but it works for quite a few numbers. The goal of this problem is to write a program to test this conjecture and find the first odd composite number for which this conjecture does not hold true. Essentially, your goal is to disprove this conjecture.

## Program Criteria

Write a program that does the following:

- Compute the first odd composite number such that it cannot be written as the sum of a prime and twice a square. Stop once you have found this number.
- Print out this smallest counterexample, with appropriate descriptive text.

## Deliverables

Place the following in a folder named `NumberTheory` in your repository:

- A Python file `N2_Goldbach_Name.py` that satisfies the program criteria.