**Goldbach’s Conjecture Project**

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AMS 325

**Project’s title:** Distribution of Goldbach’s Conjecture and Goldbach’s Weak Conjecture

**Introduction:**

1. **Goldbach’s Conjecture**

It has been almost 280 years since Goldbach’s Conjecture was first proposed. It is by far one of the most famous and enduring problems still unsolved in the world. In the letter, Christian Goldbach mentioned a conjecture that every natural even number greater than two is the sum of two prime numbers. According to Wikipedia, “T. Oliveira e Silva ran a distributed computer search that has verified the conjecture for (and double-checked up to ) as of 2013.”

1. **Goldbach’s Weak Conjecture:**

In number theory, Goldbach's weak conjecture, also known as the odd Goldbach conjecture, the ternary Goldbach problem, or the 3-primes problem, states that “Every odd number greater than 5 can be expressed as the sum of three primes.” (A prime may be used more than once in the same sum.)

This conjecture is called "weak" because if Goldbach's strong conjecture (concerning sums of two primes) is proven in 2013 by Harald Helfgott. Some state the conjecture as “Every odd number greater than 7 can be expressed as the sum of three odd primes.”

1. **The Sieve of Eratosthenes:**

In mathematics, the Sieve of Eratosthenes is an ancient algorithm for finding all prime numbers up to any given limit N. It does so by iteratively marking as composite (i.e., not prime) the multiples of each prime, starting with the first prime number, 2. Once all the multiples of each discovered prime have been marked as composites, the remaining unmarked numbers are primes. Because a composite of a number will be the product of integers smaller than , we only need to check for multiples of primes that are smaller than . In programming, using Sieve method is friendly memory way to generate prime numbers.

1. **Linear Regression:**

In statistics, linear regression is a linear approach for modelling the relationship between a scalar response and one or more explanatory variables (also known as dependent and independent variables). In linear regression, the relationships are modeled using linear predictor functions whose unknown model parameters are estimated from the data. Such models are called linear models.

The goal is to explain variation in the response variable that can be attributed to variation in the explanatory variables, linear regression analysis can be applied to quantify the strength of the relationship between the response and the explanatory variables, and in particular to determine whether some explanatory variables may have no linear relationship with the response at all, or to identify which subsets of explanatory variables may contain redundant information about the response.

**References:**

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