Lecture 13: Problem-Solving Session with Project Euler Problems

Problem 2: Even Fibonacci Numbers Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

$$1, 2, 3, 5, 8, 13, 21, 34, 55, 89, \ldots$$

By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Problem 4: Largest Palindrome Product A palindromic number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is $9009 = 91 \times 99$. Find the largest palindrome made from the product of two 3-digit numbers.

Problem 10: Summation of Primes The sum of the primes below 10 is $2 + 3 + 5 + 7 = 17$. Find the sum of all the primes below two million.

Problem 20: Factorial Digit Sum $n!$ means $n \times (n-1) \times \cdots \times 3 \times 2 \times 1$. For example, $10! = 10 \times 9 \times \cdots \times 3 \times 2 \times 1 = 3628800$, and the sum of the digits in the number 10! is $3 + 6 + 2 + 8 + 8 + 0 + 0 = 27$. Find the sum of the digits in the number 100!

Problem 39: Integer Right Triangles If p is the perimeter of a right angle triangle with integral length sides, $\{a, b, c\}$, there are exactly three solutions for $p = 120$.

$$\{20, 48, 52\}, \{24, 45, 51\}, \{30, 40, 50\}$$

For which value of $p \leq 1000$, is the number of solutions maximized?