

1.6 Fibonacci Sequence 2

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Programming for Problem Solving

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Within the first 50 terms of the Fibonacci sequence, all the terms that are divisible by 4 are as follows:

0, 8, 144, 2584, 46368, 832040, 14930352, 267914296, 4807526976

This represents that 18% of the first 50 terms are divisible by 4

Out of the first 1000 terms, 33.4% are even.

While testing out to find out what percentage of Fibonacci Numbers were divisible by what numbers, My group stumbled upon an interesting phenomenon. If you chose a prime number greater than 2, then the percentage of the prime number raised to the n could be found by dividing by the prime numbers percentage of being found by the prime number raised to the $(n-1)$. For example, let p represent the prime number, n the number the prime is being raised to, a be the percentage that the prime number divides Fibonacci Numbers, and b be the percentage that p^n divides Fibonacci Numbers, then

$$b = \frac{a}{p^{(n-1)}}$$

I tested this for up to 13^3 and it held true. After that the computational time decreased dramatically.

I also found a similar thing worked for 2 however the function is slightly different,

$$b = \frac{a}{p^{(n-2)}} \quad (\text{where when } n-2=0, p=2)$$