

Sample Problems related to the **Fibonacci Numbers** class

1. What is the sum of the terms from f_0 to f_n ?

2. Study the difference between the square of a term and the product of the terms that surround it. e.g., $(f_5)^2 - (f_3)(f_7) = 5^2 - (3)(8) = 1$. Can you make a conjecture and prove it?

3. Let r be the positive square root of 5. Let $t = (1+r)/2$. Let $a_n = t^n/r$. Using a computer and keeping track of as large a number of significant digits as possible, calculate a_n .

Do you see a relation with f_n ? Is it better or worse as n gets larger?

4. Check for several values of m and n that if m divides n then f_m divides f_n . Can you explain this?

5. Let $p > 1$ be a positive prime such as 2, 3, 5, or 7, i.e., p is not the product of two smaller positive integers. Check in several cases that, except when $p = 5$, either f_{p-1} is divisible by p or f_{p+1} is divisible by p .

Can you see a pattern for when to use $p-1$ and when to use $p+1$?