

Problem I5: Fibonacci Sequence

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MATH 361B

February 13, 2019

To determine if Cassini's identity holds, I created an if statement inside of a for loop, as well as an empty list to add the results of the if statement to. The for loop goes through each term that the code computed in the Fibonacci sequence and calculates $F_n^2 - F_{n-1}F_{n+1}$ and $(-1)^{n-1}$. If these two numbers are equal, the if statement will add "True" to the sequence containing the results of Cassini's identity, otherwise it adds "False" to the sequence.

When the initial terms of the sequence changed, I often saw a pattern where Cassini's identity held true for three consecutive terms, and then was false for three consecutive terms. For example, when I used $F_0 = 5$ and $F_1 = 8$, I saw this pattern occur.

In the pattern for the Cassini's identity for terms that I previously mentioned, I saw that when the identity was false, the absolute value of the difference between the left side and right side of the equation for Cassini's identity was 2. I tried both increasing and decreasing the right side of the equation by 2, but when I did this Cassini's identity ended up being false more often than before.