

Extras 5 - Fibonacci

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Week 5

If you find the worksheet easy, or finish quickly, you might like to try these:

1. Use the `clock_t clock()` function in the `time.h` library to determine exactly how many clock cycles are required by `f` and `g` to compute the largest possible Fibonacci number using `int` on your machine (by casting the returned `clock_t` to `double`).
2. How many Fibonacci numbers are computable using `double`?
3. Prove (by induction) that the following matrix equation holds for all $n \geq 1$:

$$\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}^n = \begin{pmatrix} f(n+1) & f(n) \\ f(n) & f(n-1) \end{pmatrix}$$

4. Using the fact that the Fibonacci series can be very naturally extended to the left $(\dots, -8, 5, -3, 2, -1, 1, 0, 1, 1, 2, 3, 5, 8, \dots)$ we can show the theorem also holds for $n = 0$.