Answer all the questions, justify your answers and show your work.

1) Compute $\phi(1296)$.

2) Prove that if $n$ is an integer such that $\phi(n) = n - 1$ then $n$ is a prime.

3) Compute $\left(\frac{263}{331}\right)$. (You may assume that both 263 and 331 are primes.)

4) Prove that $u_{n+3} = 3u_{n+1} - u_{n-1}$, where $u_n$ is the $n$’th Fibonacci number.

5) Is 149 a Gaussian prime? If yes, justify your statement. If not, find a proper divisor of it.

6) Prove that $u_{2n+2}u_{2n-1} - u_{2n+1}u_{2n} = 1$ where $u_n$ is the $n$’th Fibonacci number. (Hint: You might want to use Binet’s formula.)