

**MA 614 – Homework 2**  
**Due Wed, Jan 19<sup>th</sup>**

Your answers should be detailed explanations in quality mathematical English. You must type your homework in LaTeX.

1. For each positive integer  $n$ , express in terms of Fibonacci numbers the number of sequences  $(a_1, a_2, \dots, a_n)$  of 0's and 1's such that  $a_1 \leq a_2 \geq a_3 \leq a_4 \geq a_5 \leq a_6 \dots$ .
2. Fix  $k, n \in \mathbb{Z}_{\geq 1}$ . Find a simple expression involving Fibonacci numbers for the number of sequences  $(T_1, T_2, \dots, T_k)$  of subsets  $T_i$  of  $[n] := \{1, 2, \dots, n\}$  such that

$$T_1 \subseteq T_2 \supseteq T_3 \subseteq T_4 \supseteq T_5 \subseteq T_6 \supseteq \dots .$$