MA 614 – Homework 4
Due Monday, Jan 24

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

1. Let $n \in \mathbb{P}$ and consider a $1 \times n$ chessboard X_n (i.e., a chessboard that has one horizontal row of n squares). Determine the number t_n of ways to tile X_n with the following types of tiles: red, blue and green 1×1 tiles; yellow and orange 1×4 tiles; and black and white 1×5 tiles.

2. Give a bijection between compositions of n into 1's and 2's and compositions of $n+1$ into odd parts.

3. Give a bijective proof of the identity

$$\binom{\binom{n}{2}}{2} = 3\binom{n}{4} + n\binom{n-1}{2}.$$