MA 614 – Homework 6
Due Friday, Jan 28

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

1. Provide a bijective (combinatorial) proof that
$$\left(\!\binom{n}{m}\!\right) = \left(\!\binom{m+1}{n-1}\!\right) .$$

2. Give a simple "balls into boxes" (aka "dots and bars") proof that the total number of parts of all compositions of n is equal to $(n+1)2^{n-2}$. (The simplest argument expresses the answer as a sum of two terms).

3. Prove by induction that
$$\sum_{m=k}^{l} \binom{m}{k} = \binom{l+1}{k+1}, .$$