Math 4410 HW 8 - Due Nov. 15 in class

1. Discussion question 1 (d).

2. Discussion question 2

3. The falling factorial is denoted by $(n)_k$ and is defined by $(n)_k = \frac{n!}{(n-k)!}$.

    (a) How many functions $f : [2n] \to [n]$ are there so that for all $1 \le i \le n$, $|f^{-1}(i)| = 2$?

    (b) Prove that

    $$\binom{2n}{\underbrace{2\ 2\cdots 2}_{n\ \text{times}}} = n^{2n} + \sum_{k=1}^{n-1}\sum_{i=0}^{k}(-1)^k\binom{n}{k}\binom{k}{i}(2n)_i(n-k)^{2n-i}.$$