Homework 2, bonus problem:
Let $n$ and $p$ be positive integers. Prove (combinatorially) that

$$
\sum_{i=0}^{n}\binom{n}{i}^{2} p^{i}=\sum_{j=0}^{n}\binom{n}{j}\binom{2 n-j}{n}(p-1)^{j}
$$

