Assignment #2

Is due Wednesday 9/27.

It has been updated from
The initial version (Includes #12 page 155)

Assignment #3 Due Wednesday 10/4

Assignment #2 problem #4

Prove that $$\sum_{k=0}^{n} (-1)^k \binom{n}{k}^2 = \begin{cases} 0 & \text{if } n \text{ is odd} \\ (-1)^m \binom{2m}{m} & \text{if } n = 2m \end{cases}$$

If n is odd, then $\binom{n}{k} = \binom{n}{n-k}$ where k and $n-k$ have different parities (That is, one even and one odd).

Therefore . . . . . you finish from here (one sentence)

If $n = 2m$, Then consider The polynomials

$$(1-x^2)^n = ((1-x)(1+x))^n = (1-x)^n(1+x)^n$$

expand these Three using The binomial Theorem.

Then multiply The resulting polynomials $(1-x)^n(1+x)^n$

Since $(1-x^2)^n = (1-x)^n(1+x)^n$, The coefficients

of x^n are The same. Compare to get

The desired result.