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

Exam 1 Wednesday 10/4

Covering
1. Basic enumeration
2. Binomial Coefficients
3. Inclusion/Exclusion + Pigeonhole Principle.

Assignments 1, 2, 3

Exam questions will be similar to HW problems or almost exactly like examples done in class.
Lattice paths on grides covered on 9/11 will be one topic.

p.155

$(1-x^2)^4 = \binom{4}{0} + \binom{4}{1}x^2 + \binom{4}{2}x^4 + \binom{4}{3}x^6 + \binom{4}{4}x^8$ by the Binomial Theorem.

$(1+x)^4 = \binom{4}{0} + \binom{4}{1}x + \binom{4}{2}x^2 + \binom{4}{3}x^3 + \binom{4}{4}x^4$ by the Binomial Theorem.

$(1-x)^4 = \binom{4}{0} - \binom{4}{1}x + \binom{4}{2}x^2 - \binom{4}{3}x^3 + \binom{4}{4}x^4$ by the Binomial Theorem.

Now $(1-x)^4(1+x)^4 = [(1-x)(1+x)]^4 = (1-x^2)^4$

Therefore the coefficient of x^4 in $(1-x^2)^4$ and $(1-x)^4(1+x)^4$ are equal. Thus

$$\binom{4}{2} = \binom{4}{0}\binom{4}{4} - \binom{4}{1}\binom{4}{3} + \binom{4}{2}\binom{4}{2} - \binom{4}{3}\binom{4}{1} + \binom{4}{4}\binom{4}{0}$$

Thus

$$\binom{4}{2} = \binom{4}{0}^2 - \binom{4}{1}^2 + \binom{4}{2}^2 - \binom{4}{3}^2 + \binom{4}{4}^2$$

Do this proof for any $n = 2m$.