5 задание

$$\binom{n}{X+Y+n-1} = \sum_{k=0}^{n} \binom{n-k}{X+n-k-1}\binom{k}{Y+k-1}$$

$$\binom{n-k}{X+n-k-1} = (-1)^{n-k}\binom{n-k}{-X}$$

$$\binom{k}{Y+k-1} = (-1)^{k}\binom{k}{-Y}$$

$$(-1)^n \sum_{k=0}^{n} \binom{n-k}{-X}\binom{k}{-Y} = |p.2| = (-1)^n\binom{n}{-X-Y} = |p.6| = \binom{n}{X+Y+n-1}$$

4 задание

$$\binom{n-m}{n-X} = \sum_{k=0}^{n-m} (-1)^k \binom{k}{X}\binom{m}{n-k}$$

$$\sum_{k=0}^{n-m} \binom{k}{-X+k-1}\binom{n-k-m}{n-k} = \sum_{k=0}^{n-m} \binom{k}{-X+k-1}\binom{(n-m)-k}{(m+1)+(n-m)-k-1} =$$

$$= |p.5| = \binom{n-m}{-X+(m+1)+n-m-1} = \binom{n-m}{n-X}$$