Homework: 4W

Monroe Stephenson
Math 113: Discrete Structures

Due September 23rd, 2020

Problem 1

We know that $(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^{n-k} y^k$. We can set $x = 1, y = 2$ which takes us to

$$(1+2)^n = 3^n = \sum_{k=0}^{n} \binom{n}{k} 1^{n-1} 2^k = \sum_{k=0}^{n} \binom{n}{k} 2^k$$

which is what we set out to show.

Problem 2

a.

We know that there are $b-1$ choices for a, and $n+2-b$ choices for c, thus by the multiplicative counting principal we see $|X_b| = (b-1)(n+2-b)$

b.

Since $|X| = \binom{n+2}{3}$ and $|X_b| = (b-1)(n+2-b)$, and $|X| = \sum_{b=2}^{n+1} |X_b|$, we can put it all together to form,

$$\binom{n+2}{3} = \sum_{b=2}^{n+1} (b-1)(n+2-b)$$