

Spring 2022, Math 579: Preliminary Problem Set 3
Due: Thursday, February 10th, 2022
Binomial Theorem and Combinatorial Proofs

Preliminary problems. These problems should be completed before discussion on Thursday.

(P1) Fill in blank:

$$\sum_{k=1}^n k^3 = \underline{\hspace{2cm}} + \sum_{k=2}^{n-1} (k+1)^3.$$

Hint: reindex, then pull out terms.

(P2) Plug in carefully chosen values for x and z in the binomial theorem to obtain the identity

$$\sum_{i=0}^n (-1)^k \binom{n}{k} = 0.$$