

CSE 2500: Problem Set Five

Instructor: Aggelos Kiayias
University of Connecticut

Due October 2nd.

Exercise 1

Show that if $n > 0$, it holds that

$$\binom{n}{0} < \binom{n}{1} < \dots < \binom{n}{\lfloor n/2 \rfloor} = \binom{n}{\lceil n/2 \rceil} > \dots > \binom{n}{n-1} > \binom{n}{n}$$

Exercise 2

Prove that $\binom{n}{r} \binom{r}{k} = \binom{n}{k} \binom{n-k}{r-k}$.

[Extra Credit] Can you find a combinatorial argument that demonstrates the above equality? (i.e., count a set of objects in two different way so that one matches the left-hand-side and the other matches the right-hand-side).