

MATH 113: DISCRETE STRUCTURES
WEDNESDAY WEEK 4 HANDOUT

Problem 1. The first diagonal in Pascal's triangle is the constant sequence of 1's. The second diagonal is the sequence of positive integers 1, 2, 3, ... What is the third diagonal? The fourth? The n -th?

Problem 2. You proved in your homework that $n^2 = \binom{n}{2} + \binom{n+1}{2}$. Where do these terms appear in Pascal's triangle? Use your "third diagonal" interpretation from Problem 1 to produce a new proof of this identity.

Problem 3. How many odd numbers are there in the 2019-th row of Pascal's triangle? (To answer this, you may as well find a general formula for the number of odd numbers in the n -th row of Pascal's triangle. [Hint: How many odd numbers in the 2^k -th row?])

