

Math 2001: PHW5

1. From the book do:
 - 3.1: 2, 6, 10
 - 8: 2, 6, 14
2. Color all the odd numbers in Pascal's triangle red and all the even numbers blue. What pattern do you get? Describe it as precisely as you can.
3. Let $k, l, m, n \in \mathbb{Z}_{\geq 0}$ be such that $n = k + l + m$. The *trinomial coefficient* $\binom{n}{k, l, m}$ is given by the rules

$$(1) \text{ for } k + l = n, \binom{n}{k, l, 0} = \binom{n}{k, 0, l} = \binom{n}{0, k, l} = \binom{n}{k},$$

$$(2) \binom{n}{k, l, m} = \binom{n-1}{k-1, l, m} + \binom{n-1}{k, l-1, m} + \binom{n-1}{k, l, m-1}.$$

The following questions use this definition.

- (a) What are all the trinomial coefficients for $n = 1, 2, 3$?
- (b) Describe the "triangle" of trinomial coefficients (Hint: Think three dimensional Pascal's triangle).