Lecture 25, class activity. Binomial Theorem, &c.

Recall the binomial theorem, which states that

$$(x + y)^n = \sum_{k=0}^{n} \binom{n}{k} x^k y^{n-k}$$

1. Write out the general expansion of $(x + 1)^n$ using the binomial theorem. Also write out the specific cases $n = 2, 3, 4$.

2. Now plug in $x = 1, y = 1$ to the original theorem and determine $\sum_{k=0}^{n} \binom{n}{k}$.

   Again write out the specific cases $n = 2, 3, 4$.

3. Plug in $x = 2, y = 1$ to obtain the formula for the sum $\sum_{k=0}^{n} \binom{n}{k} 2^k$.

4. **Hard!** Can you determine a way to compute $\sum_{k=0}^{n} \binom{n}{k} \left(\frac{3}{2}\right)^k$?