

Solutions to Quiz 1

1. $\binom{160}{4}$. Choosing a Committee is just choosing a subset of the set of students.
2. $160!$. The rank ordering of 160 students is an 160 -permutation (that is, a permutation).
3. 2^6 . Associate each hexagram with an element of $\{0, 1\}^6$ by associating a line with 1 and a broken line with 0.
4. Let X be a set with n elements. To choose a subset with k elements is to exclude a subset with $n-k$ elements. We therefore can establish a bijection between the set of all k -subsets with the set of all $(n-k)$ -subsets.
5. The total number of subsets of an n element set is 2^n . This is equal to the sum of the number of 0-subsets and the number of 1-subsets, and the number of 2-subsets etc which delivers the result.

6. Let X be a set with $n+1$ elements.
 The number of r -subsets is $\binom{n+1}{r}$.

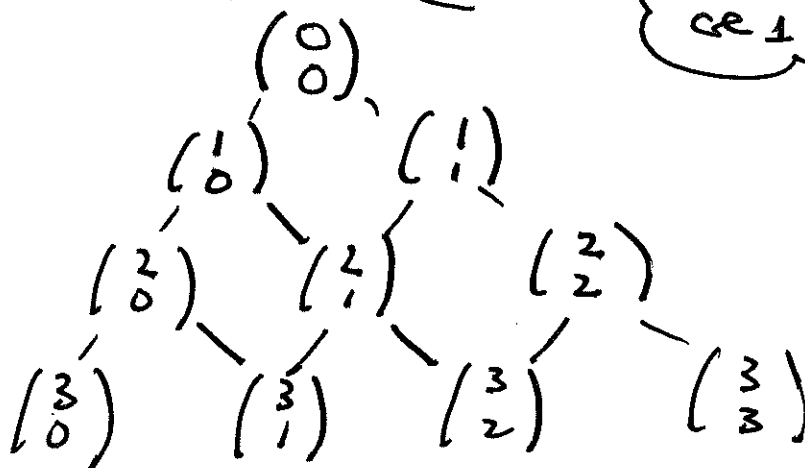
"Colour" one of the elements of X red.

A subset of X either includes the red element or excludes the red element.

- The number of subsets with r elements that include the red element will be $\binom{n}{r-1}$

- The number of subsets with r elements that exclude the red element will be $\binom{n}{r}$.

It follows that $\binom{n+1}{r} = \binom{n}{r-1} + \binom{n}{r}$ (we see this using partitions).



internal elements constructed according to the rule we have verified

It now follows that we have Pascal's Δ .