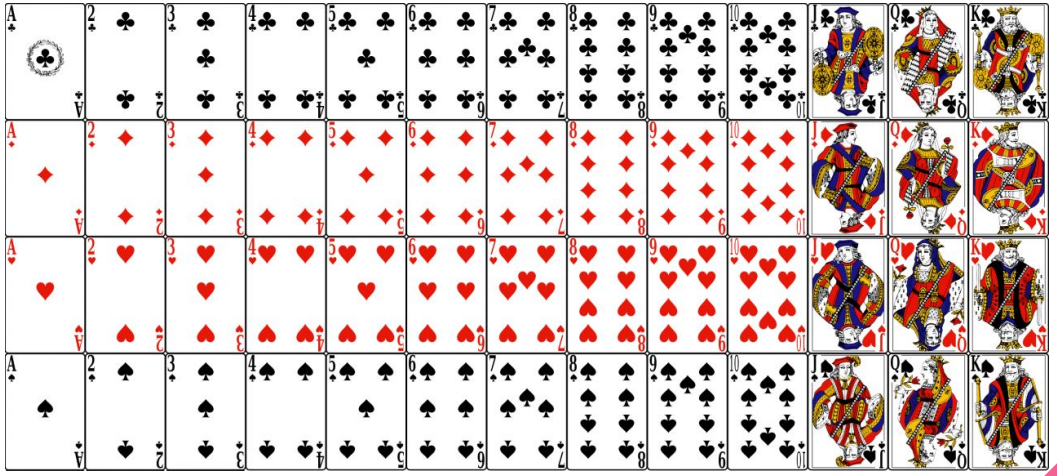
Permutations and Weak order

OPAHC : Partial Order and Hopf Algebras in Combinatorics

Permutations: an easy way to understand

Shuffling a deck of cards



Permutations

Let’s take less cards: 8

Permutations

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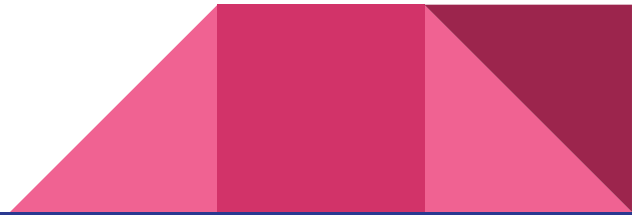
12345678 **15738642** **18472635**

Permutations

Definition: A **permutation** of size n is a word on the alphabet[n] := {1,...,n} where each letter appears exactly once.

Example, all 6 permutations of size 3 :

123, 132, 213, 231, 312, 321

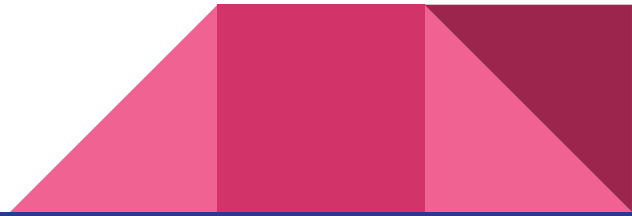


Bubble sort

15738642

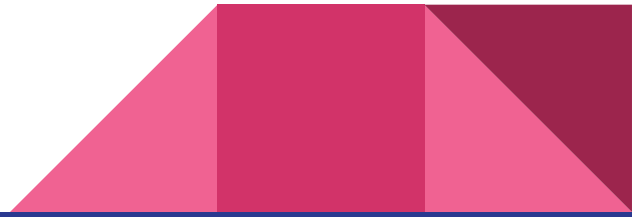
Bubble sort

15738642 -> 15378642



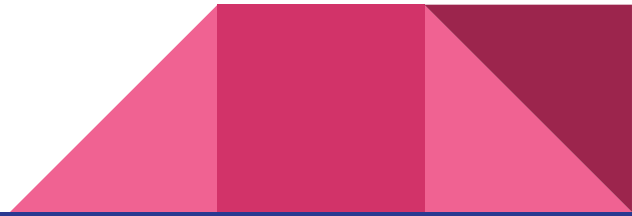
Bubble sort

15738642 -> 15378642 -> 13578642



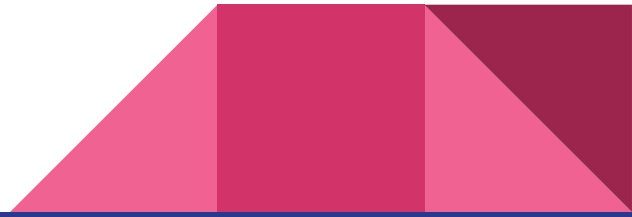
Bubble sort

15738642 -> 15378642 -> 13578642 -> 13576842



Bubble sort

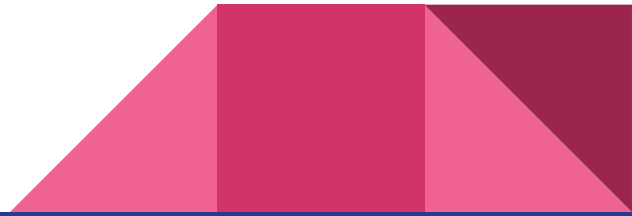
15738642 -> 15378642 -> 13578642 -> 13576842 -> …… -> 12345678



Bubble sort

15738642 -> 15378642 -> 13578642 -> 13576842 -> …… -> 12345678

15738642 -> 15738624 -> 15738264 -> 15738246 -> …… -> 12345678



Bubble sort

15738642 -> 15378642 -> 13578642 -> 13576842 -> …… -> 12345678

15738642 -> 15738624 -> 15738264 -> 15738246 -> …… -> 12345678

Less letters: 3

321 -> 231 -> 213 -> 123

321 -> 312 -> 132 -> 123

Bubble sort

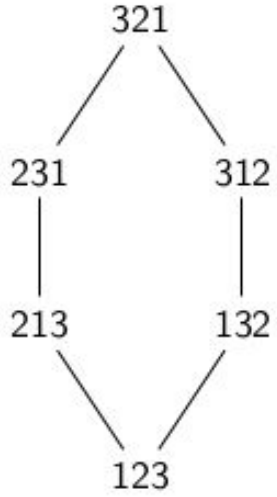
15738642 -> 15378642 -> 13578642 -> 13576842 -> …… -> 12345678

15738642 -> 15738624 -> 15738264 -> 15738246 -> …… -> 12345678

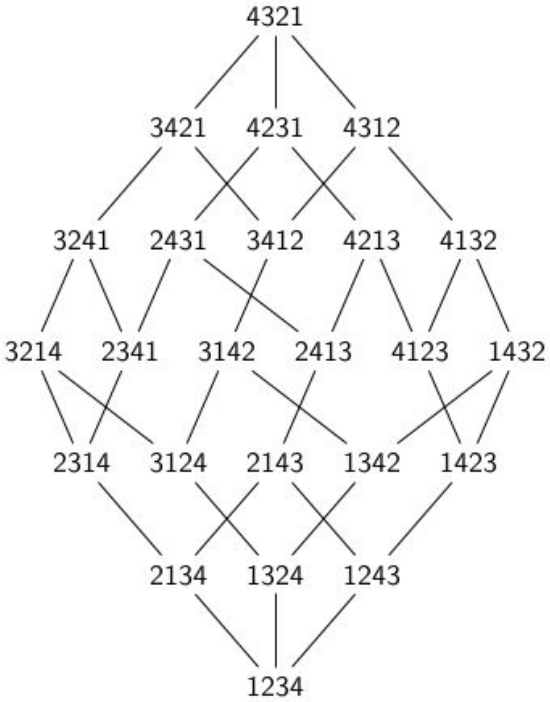
Less letters: 3

321 -> 231 -> 213 -> 123

321 -> 312 -> 132 -> 123



Weak order size 4



Weak order size 4 (permutohedron)