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Handout 5

Randomized Algorithms and Probabilistic Methods: Advanced Topics

Exercise 1

(a) Show that the graph $G = (V, E)$, where V is the set of order-n Latin squares and E is defined by row/column/symbol-swaps, is not connected. Recall that the number of order-n Latin squares is $((1 + o(1))(n/e^2))^{n^2}$.

(b) Show that the graph $G = (V, E)$, where V is the set of order-n Latin squares and E is defined by swaps along cycles (fix two rows and swap symbols along a cycle of the corresponding permutation), is not connected. Recall the notion of an order-n cyclic Latin squares and note that it corresponds to the addition table of $\mathbb{Z}_n$.

(c) Show that the graph $G = (V, E)$, where V is the set of order-n Latin squares and E is defined by row/column/symbol-swaps in Latin sub-squares, is not connected.