

Please carefully read and follow the general instructions regarding exercises. Failing to meet the requirements might lead to penalties. <https://elearn.uef.fi/mod/page/view.php?id=293750>

If you suspect that something is wrong with some exercise question, please contact the lecturer.

If you face persistent issues while working on an exercise, do ask for help, e.g. during a course meeting or by contacting the lecturer via email.

Consider the dataset containing four items and six transactions represented as a binary matrix in Figure 1.

tid	a	b	c	d
(1)			■	■
(2)	■			
(3)	■	■		■
(4)		■		■
(5)	■	■	■	■
(6)	■			■

Figure 1: Transactional dataset, as a binary matrix

**Problem 1** (Apriori algorithm).

a) Run the level-wise apriori algorithm to mine all frequent itemsets at absolute minimum support of  $\sigma = 2$ , assume an ordering of items by frequency. Show intermediate steps, i.e. all candidates generated and pruned, where relevant, as well as the corresponding enumeration tree.