

# Approximation Algorithms in Allocation, Scheduling and Pricing

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## Approximation algorithms in allocation, scheduling and pricing

Tim Oosterwijk

1. A hardness result proved for an optimization problem does not necessarily hold for special cases of the problem (Chapter 2).
2. The encoding of a problem instance should always be as succinct as possible, for changing from a conventional encoding to a succinct encoding can turn a polynomial time algorithm into an exponential one (Chapter 3).
3. Though a non-constant factor in a double exponential has a huge impact on the running time of an algorithm, neither theoretical researchers nor practical users seem to concern themselves so much with learning whether the factor can be removed (Chapter 4).
4. Choosing the arrival order of random variables yourself does not necessarily give you an advantage over arrivals that are uniform at random (Chapter 5).
5. Consider the Parsimony Haplotyping problem, in which a set  $G$  of genotypes  $g \in \{0,1,2\}^k$  is given and a set  $H$  of haplotypes  $h \in \{0,1\}^k$  needs to be found, resolving these genotypes in the following way: each genotype  $g \in G$  can be written as  $g = h \oplus h'$ , where  $h, h' \in H$  and  $0 \oplus 0 = 0$ ,  $1 \oplus 1 = 1$  and  $0 \oplus 1 = 2$ . If  $|g \in G: g(i) = 2| \leq 2$  for every  $i \in \{1, 2, \dots, k\}$ , this problem can be solved in polynomial time if the compatibility graph of the instance is a  $k$ -bounded 2-paste of cliques and graphs of bounded treewidth.

J.C.M. Keijsper and T. Oosterwijk. "Tractable Cases of  $(*,2)$ -Bounded Parsimony Haplotyping". In: *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 12.1 (2015), pp. 234-247.

6. Hiring a new employee and selling an item through posted prices is essentially the same.
7. After finding new results for an optimization problem, one should check for seemingly unrelated problems in different fields to which the results could perhaps translate.
8. Designing a proof is like an instance of the shortest  $(s,t)$ -path problem in which you find a path starting at  $s$  and a path ending in  $t$  that need to connect somewhere in the middle.
9. In contrast to everyday use of language, the meaning of statements is unambiguous in the language of mathematics if used properly.
10. Equality of rights does not imply equal treatment.
11. The deepest solace lies in understanding. Shuddering before the beautiful world of mathematics, its music can be deafening. *Free to Richard Dawkins and Tuomas Holopainen*