

kreher-stinson

**Algorithms from the book implemented
in GAP**

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Chapter 1

Generating Combinatorial Objects

1.1 Subsets

1.1.1 KSSubsetLexRank

▷ `KSSubsetLexRank(number, subset)` (function)

Returns the rank of *subset* as a subset of the set of numbers from 1 to *number* (Algorithm 2.1).

1.1.2 KSSubsetLexUnrank

▷ `KSSubsetLexUnrank(number, rank)` (function)

Returns the subset of $\{1..number\}$ whose rank is *rank*. (Algorithm 2.2).

Chapter 2

Bactracking

2.1 Knapsack

2.1.1 KSCheckKnapsackInput

▷ `KSCheckKnapsackInput(profits, weights, capacity)` (function)

Checks for valid input data for the Knapsack problems (Problems 1.1-1.4).

2.1.2 KSKnapsack1

▷ `KSKnapsack1(profits, weights, capacity)` (function)

Implementation of Algorithm 4.1.

2.1.3 KSKnapsack2

▷ `KSKnapsack2(profits, weights, capacity)` (function)

Implementation of Algorithm 4.3.

2.2 Generating all cliques

2.2.1 KSAllCliques

▷ `KSAllCliques(graph)` (function)

Implementation of Algorithm 4.4. A graph G is defined by the list *graph*, which must be a list of subsets of $\{1, \dots, n\}$, for some integer n . The neighbors of vertex i are the elements of *graph*[i].

2.3 Exact cover

2.3.1 KSExactCover

▷ `KSExactCover(number, cover)` (function)

Finds an subcollection of *cover* (which is a set of subsets of $\{1, \dots, \textit{number}\}$) that is an exact cover of $\{1, \dots, \textit{number}\}$, if it exists.

2.4 Exercises

2.4.1 KSQueens

▷ `KSQueens(size)` (function)

Solves the n queens problem for a $\textit{size} \times \textit{size}$ board.

Example

```
gap> KSQueens(4);  
[ 2, 4, 1, 3 ]  
[ 3, 1, 4, 2 ]
```

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