# Solutions for Exercise Sheet 10

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Our solutions for Exercise Sheet 10.

## Exercise 1

Give the permutation with rank 64 of 8 relations. Seed the algorithm with the permutation $\langle R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 \rangle$.

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| $i$ | $r$ | $r' = r \mod i$ | $\pi$ |
|---|---|---|---|
| - | - | - | $\langle 1, 2, 3, 4, 5, 6, 7, 8 \rangle$ |
| 8 | 64 | 0 | $\langle 8, 2, 3, 4, 5, 6, 7, 1 \rangle$ |
| 7 | 8 | 1 | $\langle 8, 7, 3, 4, 5, 6, 2, 1 \rangle$ |
| 6 | 1 | 1 | $\langle 8, 6, 3, 4, 5, 7, 2, 1 \rangle$ |
| 5 | 0 | 0 | $\langle 5, 6, 3, 4, 8, 7, 2, 1 \rangle$ |
| 4 | 0 | 0 | $\langle 4, 6, 3, 5, 8, 7, 2, 1 \rangle$ |
| 3 | 0 | 0 | $\langle 3, 6, 4, 5, 8, 7, 2, 1 \rangle$ |
| 2 | 0 | 0 | $\langle 6, 3, 4, 5, 8, 7, 2, 1 \rangle$ |
| 1 | 0 | 0 | $\langle 6, 3, 4, 5, 8, 7, 2, 1 \rangle$ |

The permutation with rank 64 is $\langle R_6, R_3, R_4, R_5, R_8, R_7, R_2, R_1 \rangle$

## Exercise 2

Give the shape of the random join tree (with crossproducts) with rank 125 for 8 relations. Label the leaves of the tree according to the permutation resulting from Exercise 1.

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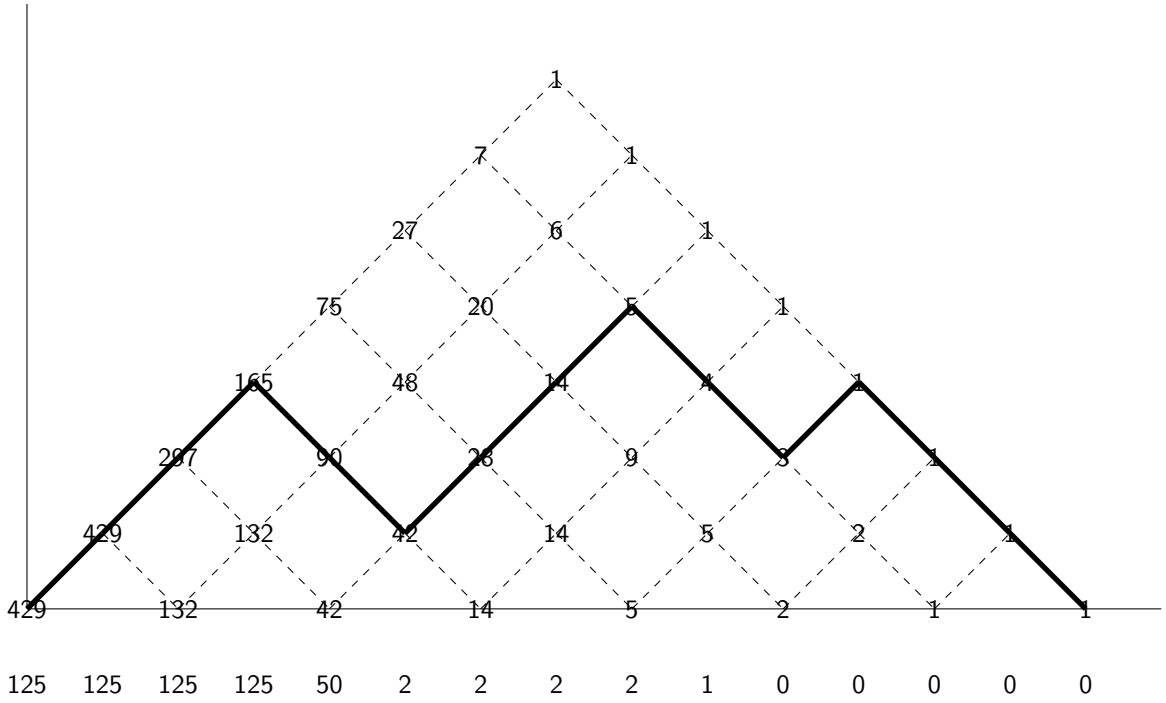
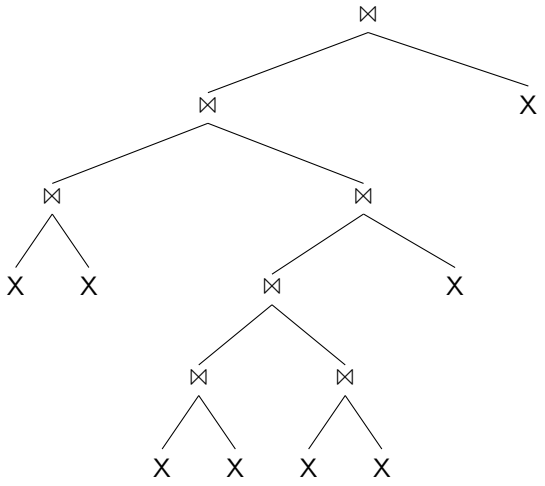
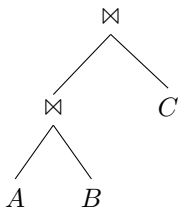


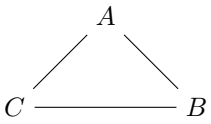

Representation using parenthesis: ((())((()))()))
Tree shape:



## Exercise 3

Starting with the following join tree, apply the ExhaustiveTransformation2 algorithm with Rule-Set 1. Assume that the query graph is a clique.

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| $Class$ | $Initialization$ | $Transformation$ | $Step$ |
|---|---|---|---|
| $\{A, B, C\}$ | $\{A, B\} \bowtie_{111} C$ | $C \bowtie_{000} \{A, B\}$ | 2 |
| | | $A \bowtie_{100} \{B, C\}$ | 3 |
| | | $B \bowtie_{100} \{A, C\}$ | 5 |
| | | $\{B, C\} \bowtie_{000} A$ | 7 |
| | | $\{A, C\} \bowtie_{000} B$ | 8 |
| $\{A, B\}$ | $A \bowtie_{111} B$ | $B \bowtie_{000} A$ | 1 |
| $\{B, C\}$ | | $B \bowtie_{111} C$ | 3 |
| | | $C \bowtie_{000} B$ | 4 |
| $\{A, C\}$ | | $A \bowtie_{111} C$ | 5 |
| | | $C \bowtie_{000} A$ | 6 |