**Report: Exercises 4**

Sevde Yanik & Sima Esmaeili

**Problem 1**

Using MPI in C++, the Vogel-Strauß algorithm is implemented. The algorithm first puts all messages into network using asynchronous send operations and then it receives everything that arrives. The implementation is tested by running it on multiple processes where each process sends a unique message.

The implementation is explained step-by-step:

1. At the beginning MPI is initialized and the rank and size of the MPI communicator is retrieved.
2. A unique message is generated for each process based on its rank.
3. Using a loop, each process asynchronously sends its message to all other processes, except for itself.
4. Another loop is used to receive messages from other processes. Again, each process receives messages from all other processes, except for itself.
5. All messages are printed to the console together with the rank of the process that retrieved it.
6. MPI is finalized.

**Problem 2**