

# Homework 12 - optional

General comments:

- For test cases use vector  $x$  generated with `rand(1,N)` where  $N$  number of elements in test vector. See more help about `rand`, but in short it fills matrix of specified size with random numbers in the range of 0 to 1. In our case this matrix is a vector since we specified its size as  $1 \times N$ .
- Try your sort algorithms with reasonably small  $N$  (less than 10) at first. Then you can check that output is fine by yourself.
- Your sorting algorithm should sort in ascending order.
- Do not forget to run some test cases.

## Problem 1 (10 points)

Write your own implementation of the heap sort algorithm. Call it 'heapsort'.

## Problem 4 (5 points)

For your algorithm 'heapsort' and Matlab built in 'sort'. Plot (on the same figure) their time of execution vs number ( $N$ ) of the elements of the input test vector. Do not forget to label each curve, see `legend` command. How is your algorithm performing in comparison to Matlab's one?

- $N$  should span from 1 to 1000000 (at least 100 points).
- You may like `loglog` plot presentation better.
- Hint. To find the execution time use `tic` and `toc`, see more help for them. For example  
`tic; sort(xtest); toc`  
There is also a way to save execution time to a variable or array.