This assignment is due on November 17/19 in your respective tutorial groups. You are allowed (even encouraged) to discuss these problems with your fellow classmates. All submitted work, however, must be written individually without consulting someone else’s solutions or any other source like the web.

Exercise 1 Let $G$ be a graph with a distinguished root vertex. Design an asynchronous distributed algorithm that

a) determines the maximum vertex ID in $G$.

b) determines the average value of the vertex IDs in $G$.

Provide bounds for the message and time complexity of your algorithms. Can these be improved if we assume a synchronous setting?

Exercise 2 Show that on the complete graph on $n$ vertices the message complexity of the asynchronous distributed Bellman-Ford algorithm is $\Omega(n^3)$ if the messages are delivered in a bad order.