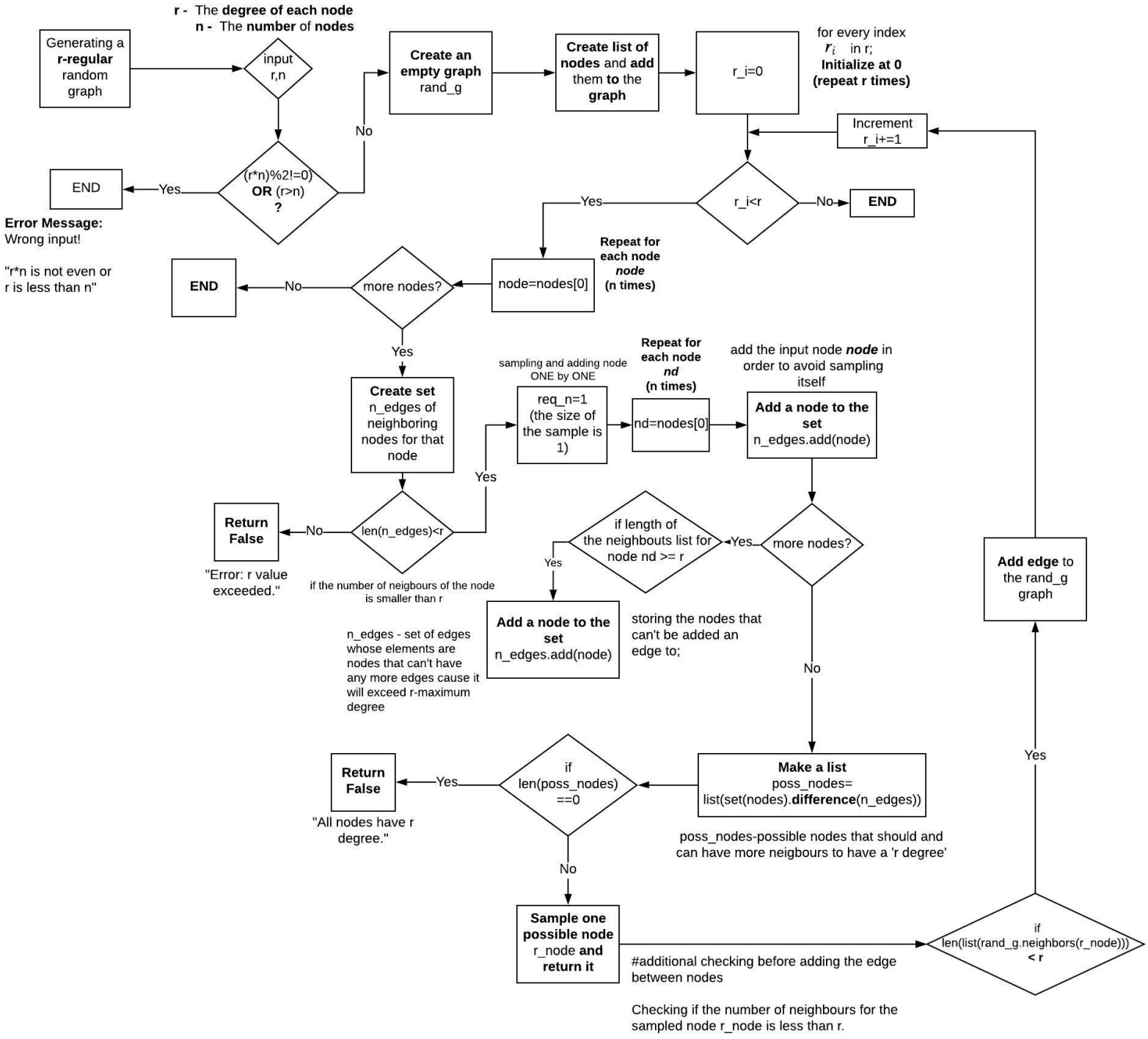
Networking for big data Data centers

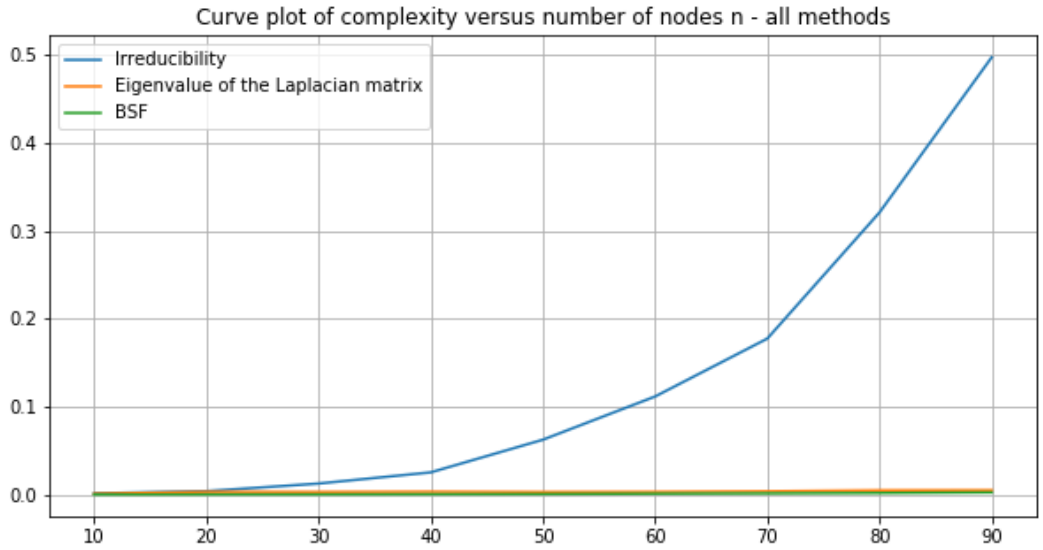
Homework assignment

Omirbanu Nurassilova 1848425
Dusica Stepic 1861402
Katsiaryna Zavadskaya 1847985

Flow diagram of the algorithm to generate r -regular random graphs



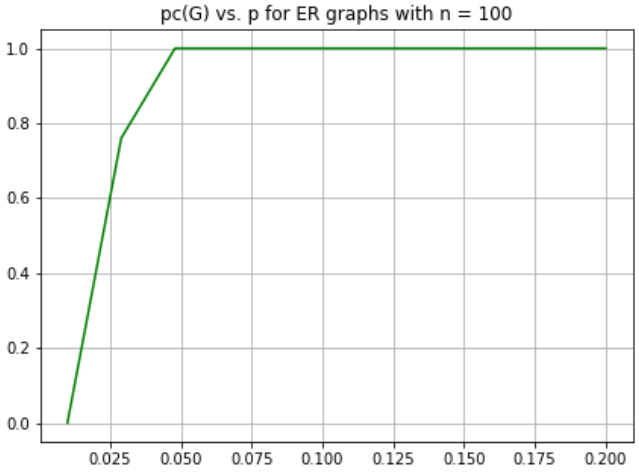
(1) Curve plot of complexity versus number of nodes n for the three connectivity checking algorithms;



Ranking of the connectivity checking algorithms (from best to worst):

1. BSF
2. Eigenvalue of the Laplacian matrix
3. Irreducibility

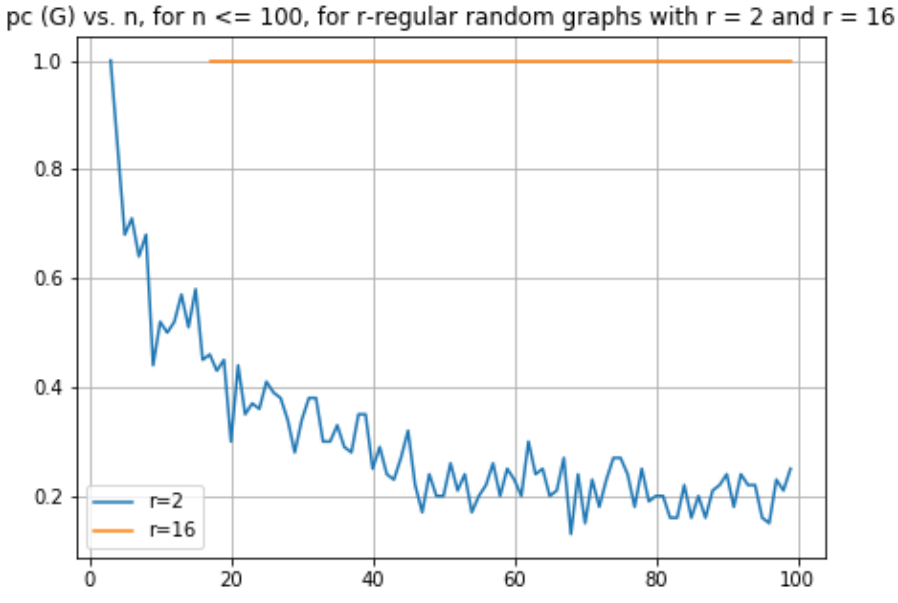
(2) Probability of a connected ER random graph as a function of p for n = 100;



Based on the graph we can conclude that with the increase of the probability, that an edge exists, *p* that estimated probability $p_c(G)$ of the connectivity of the graph is converging to 1.

More specifically it is visible from the value of *p* 0.05.

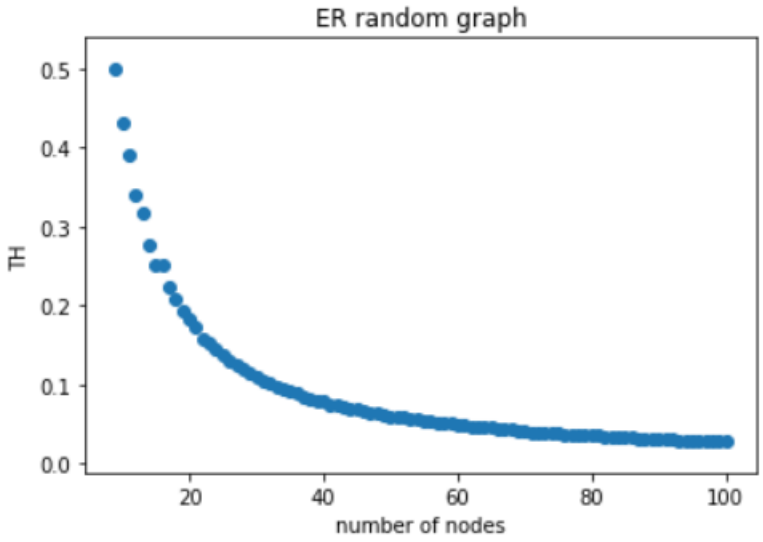
(3) Probability of a connected r -regular random graph as a function of n for r = 2 and 16



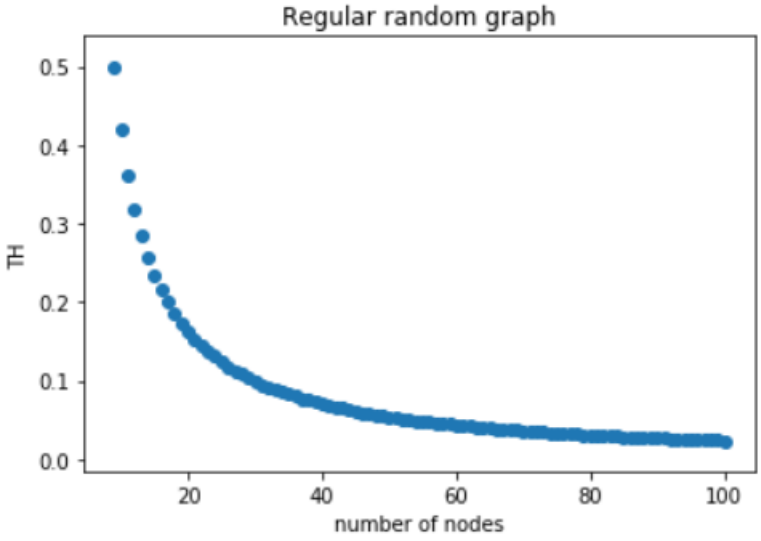
Since r is a degree of each node of the graph; it is logical that with the increase of the number of nodes with fixed value ***r=2*** the probability that Graph is connected is decreasing. On the other side; when ***r*** value is 16; which is a large number of neighbors for each node estimated probability is 1 since we are considering number of nodes from 17 to 100.

In the second part of the homework we had to plot values of Throughput with changing ***n*** value. Value of ***n*** varied from 9 to 100. We implemented a function that computes TH value according to n and then plotted results.

(1) Throughput bound versus n for ER topology



(2) Throughput bound versus n for r -regular topology



Our two plots show that with increasing number of nodes in the graph throughput values is decreasing significantly in the both cases. It is logical since we have this formula: $TH \leq m/(hv_f)$ where h is the mean of path lengths in the graph and $v_f = n(n-1)/2$. Both values of h and v_f is growing with enlarging a graph(increasing number of nodes).