Report of the First Homework of NBD

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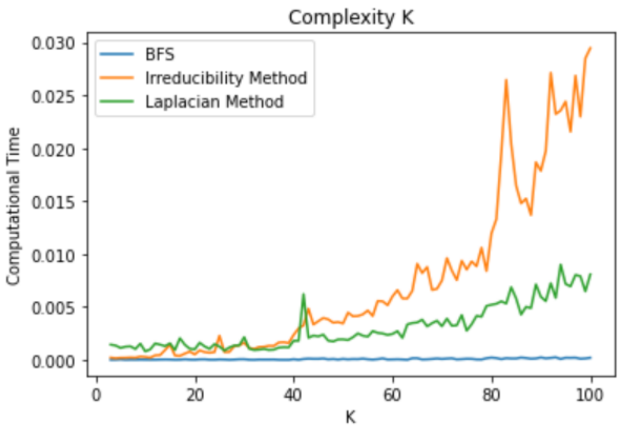
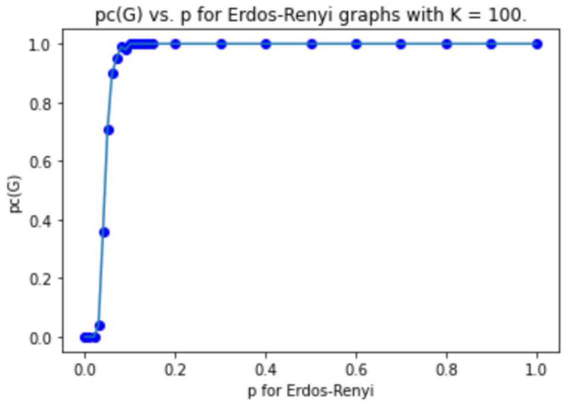
PART 1

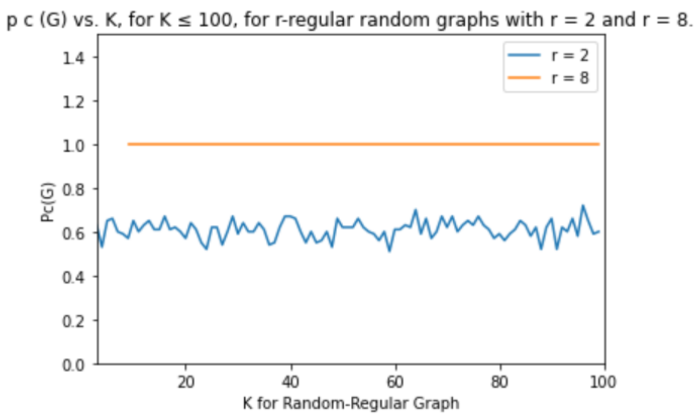
(i) Curve plot of complexity versus number of nodes K, for the three connectivity checking algorithms



(ii) Probability of a connected ER random graph as a function of p for K = 100 nodes



(iii) Probability of a connected r-regular random graph as a function of the number of nodes K for r = 2 and 8.



PART 2

(i) Derivation of expression of r as a function of n

$$SE(Jf) = S(n-r)$$
$$SE(FT) = \frac{n^3}{4}$$
$$S(FT) = \frac{5n^2}{4}$$
$$\frac{n^3}{4} = \frac{5n^2}{4}(n-r)$$
$$4n = 5r$$
$$r = \frac{4n}{5},$$

where *FT* = Fat Tree, *Jf* = Jellyfish, *S* = number of switches, *SE* = number of servers

(ii) Expression of TH as a function of n and h

$$TH \leq \frac{l}{\bar{h}v_f} = \frac{Nr}{\bar{h}N} = \frac{r}{\bar{h}} = \frac{4n}{5\bar{h}}$$

(iii) Table with six columns of numerical values: n, N, S, L, TH Fat-Tree ,TH Jellyfish computed for n = 20, 30, 40, 50, 60.

N = # of servers.
S = # of switches.
L = # of links connecting switches.
n = # number of ports of a switch.
h = mean shortest path lengths for server-to-server paths.