The following greedy algorithm determines the degeneracy of a graph GG (defined to be the maximum, taken over all subgraphs HH of GG, of the minimum degree of HH).

Initialise G1:=GG1:=G and n:=|V(G)|n:=|V(G)|. For i=1,…,ni=1,…,n, let didi be the minimum degree of GiGi, let vivi be a vertex of degree didi in GiGi, and let Gi+1:=Gi−viGi+1:=Gi−vi.

Say didi is maximum among d1,…,dnd1,…,dn. I claim that didi equals the degeneracy of GG. Since GiGi has minimum degree didi, the degeneracy of GG is at least didi. Conversely, consider a subgraph HH of GG. Let vjvj be the vertex in HH with jj minimum. Then didi is at least djdj (by the definition of didi), which equals the degree of vjvj in GjGj, which is at least the degree of vjvj in HH (since HH is a subgraph of GjGj by the definition of vjvj), which is at least the minimum degree of HH. That is, the minimum degree of HH is at most didi. Hence the degeneracy of GG is at most didi. Therefore the degeneracy of GG equals didi.

Degeneracy : Degeneracy of a graph is the largest value k such that the graph has a k-core. For example, the above shown graph has a 3-Cores and doesn’t have 4 or higher cores. Therefore, above graph is 3-degenerate.

Degeneracy of a graph is used to measure how sparse graph is.