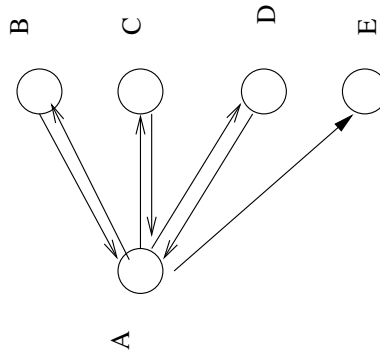


Problem 1. (50 points)

You are given the graph below. Apply each one of the ranking algorithms till convergence and find the ranks/authority values/ hub values for each one of the nodes A, \dots, E . Use the following algorithms. Use appropriate initial conditions.

- Kleinberg's hub and authority algorithm.
- PageRank with $1 - d$ and $d = 0.85$. Initial condition $1/N$.
- PageRank with $(1 - d)/N$ and $d = 0.85$. Initial condition $1/N$.



Use the algorithm of Subject 5 (corrected, as explained on the course web-page). The algorithm below follows the third variant above. To get the second variant correct line 13.

```

PageRank(G,V,E)
1. for all vertices u in V      /* Initialization Step */
2.   Src[u] = 1/N;
3. small = something-small;
4. while (convergence-distance > small) {
5.   for all v in V
6.     D[v]=0;
7.   for(i=0;i<|V|;i++) {
8.     Read-Adjacency-List(u,m,d1,d2,...,dm);
9.     for(j=1;j<=m;j++)
10.      D[dj] = D[dj] + Src[u]/m
11.   }
12. for all v in V
13.   D[v] = d * D[v] + (1-d)/|V|
14. convergence-distance = ||S-D|| /* Euclidean distance */
15. Src=D;
16. }
  
```