Clustering of social graphs

Clustering of social graphs

- Communities
  - A collection of individuals with dense relationship patterns within a group and sparse links outside the group.

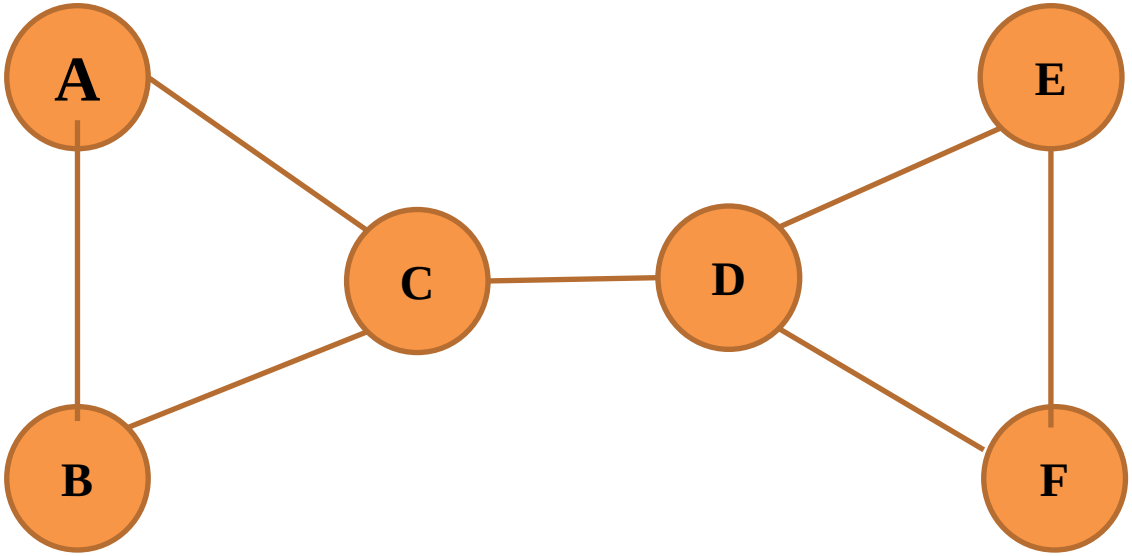
Betweenness

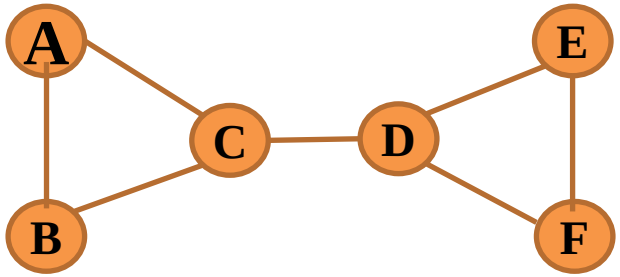
- The Vertex betweenness centrality BC(v) of a vertex v is defined as follow

$$\text{BC(v)} = \sum_{u,v \in V} \frac{\sigma_{uw}(v)}{\sigma_{uw}}$$

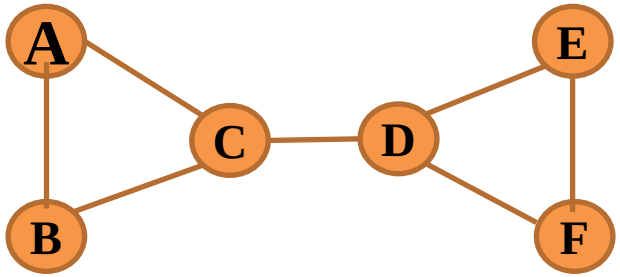
- σ_{uw} = Total Number of shortest path between node u and w
- $\sigma_{uw}(v)$=total number of shortest paths between node u and w that pass through v

Betweenness Centrality

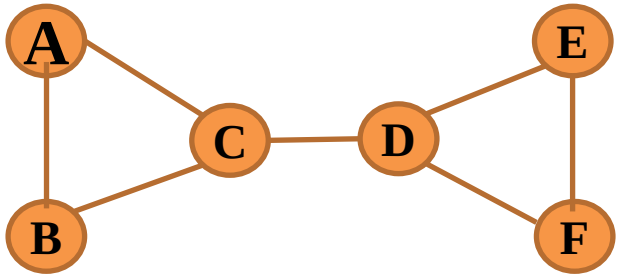




	σ_{uw}	$\sigma_{uw}(v)$	$\sigma_{uw}(v)/\sigma_{uw}$
(A, B)	1	0	0
(A, D)	1	1	1
(A, E)	1	1	1
(A, F)	1	1	1
(B, D)	1	1	1
(B, E)	1	1	1
(B, F)	1	1	1
(D, E)	1	0	0
(D, F)	1	0	0
(E, F)	1	0	0

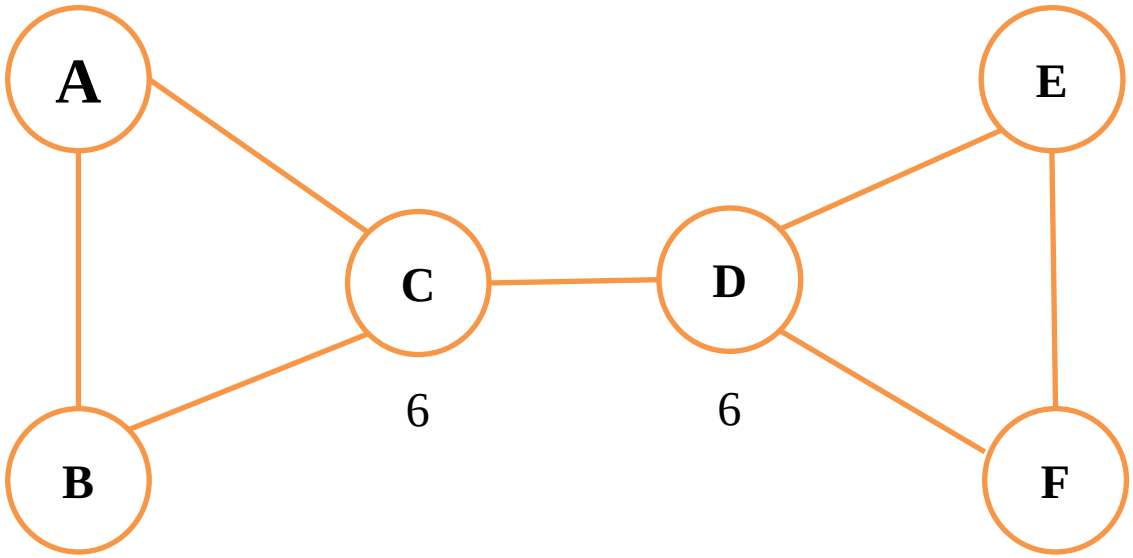


	σ_{uw}	$\sigma_{uw}(v)$	$\sigma_{uw}(v)/\sigma_{uw}$
(A, B)	1	0	0
$\boldsymbol{(A, D)}$	**1**	**1**	**1**
$\boldsymbol{(A, E)}$	**1**	**1**	**1**
$\boldsymbol{(A, F)}$	**1**	**1**	**1**
$\boldsymbol{(B, D)}$	**1**	**1**	**1**
$\boldsymbol{(B, E)}$	**1**	**1**	**1**
$\boldsymbol{(B, F)}$	**1**	**1**	**1**
(D, E)	1	0	0
(D, F)	1	0	0
(E, F)	1	0	0

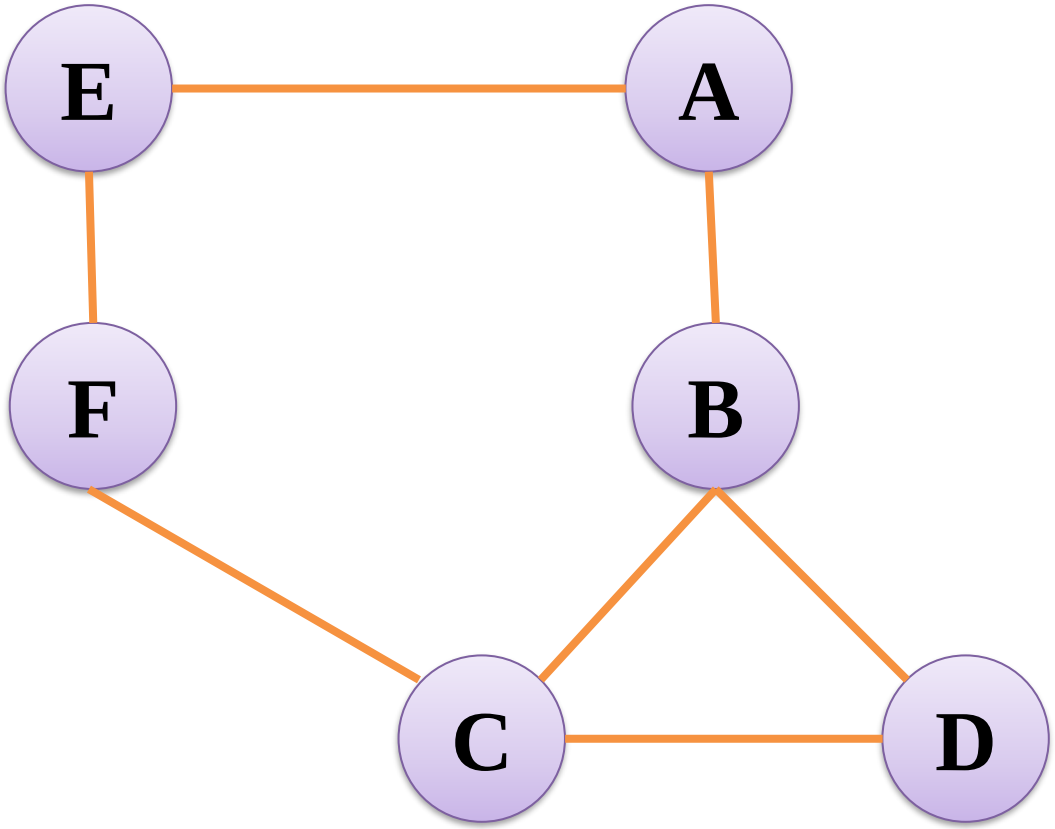


	σ_{uw}	$\sigma_{uw}(v)$	$\sigma_{uw}(v)/\sigma_{uw}$
(A, D)	1	1	1
(A, E)	1	1	1
(A, F)	1	1	1
(B, D)	1	1	1
(B, E)	1	1	1
(B, F)	1	1	1

Betweenness centrality for C = 6

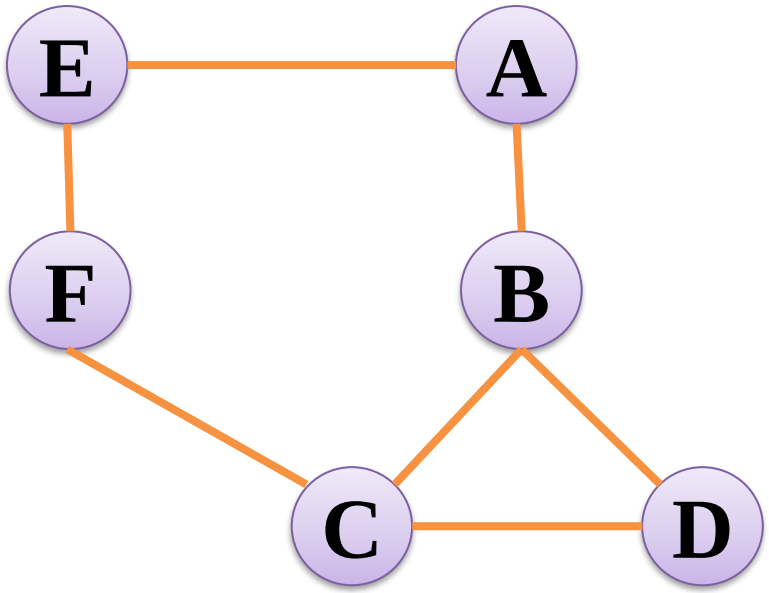

A
E
C
D
6
6
B
F

Example #2



Betweenness Centrality for A= ?

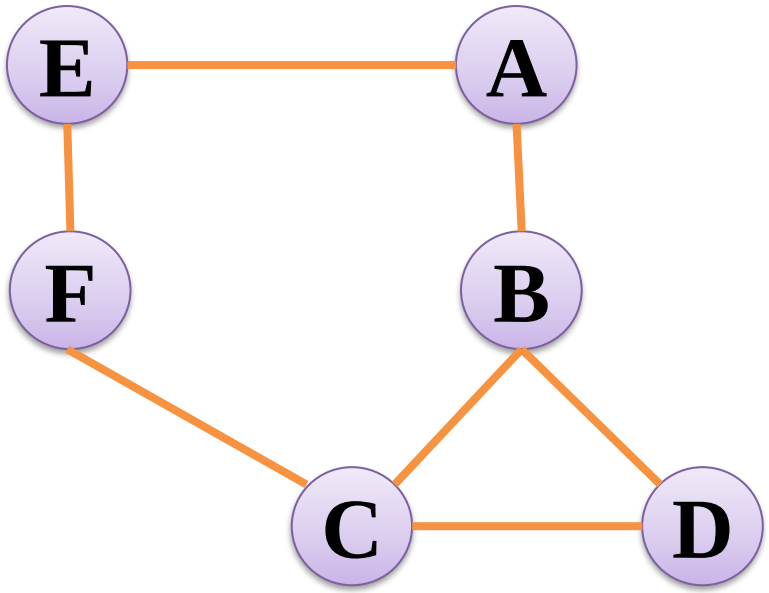
- BC = 0/1 = 0
- BD = 0/1 = 0
- BE = 1/1 = 1
- BF = 0/1 = 0
- CD = 0/1 = 0
- CE = 0/1 = 0
- CF = 0/1 = 0
- DE = 1/2 =0.5
- DF = 0/1 = 0
- EF = 0/1 = 0



Betweenness Centrality for A= ?

Betweenness Centrality for A= ?

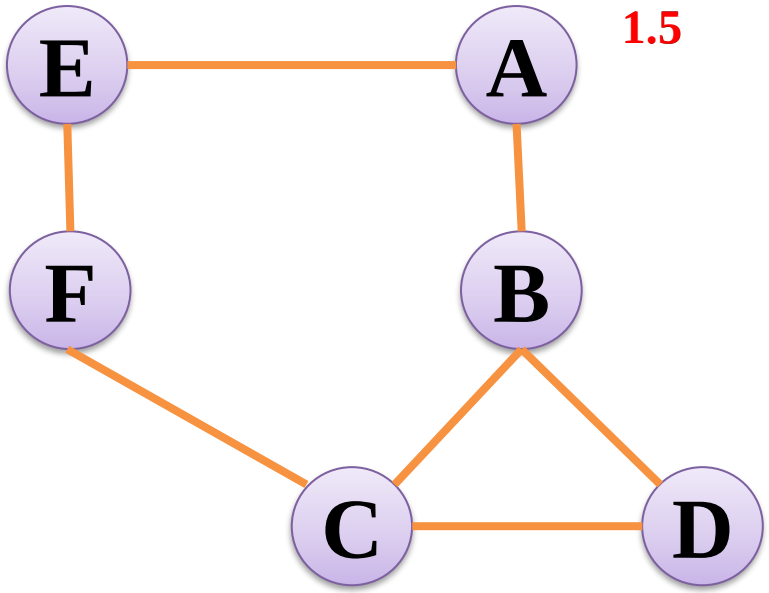
- BC = 0/1 = 0
- BD = 0/1 = 0
- **BE = 1/1 = 1**
- BF = 0/1 = 0
- CD = 0/1 = 0
- CE = 0/1 = 0
- CF = 0/1 = 0
- **DE = 1/2 =0.5**
- DF = 0/1 = 0
- EF = 0/1 = 0



Betweenness Centrality for A= 1.5

Betweenness Centrality for B= ?

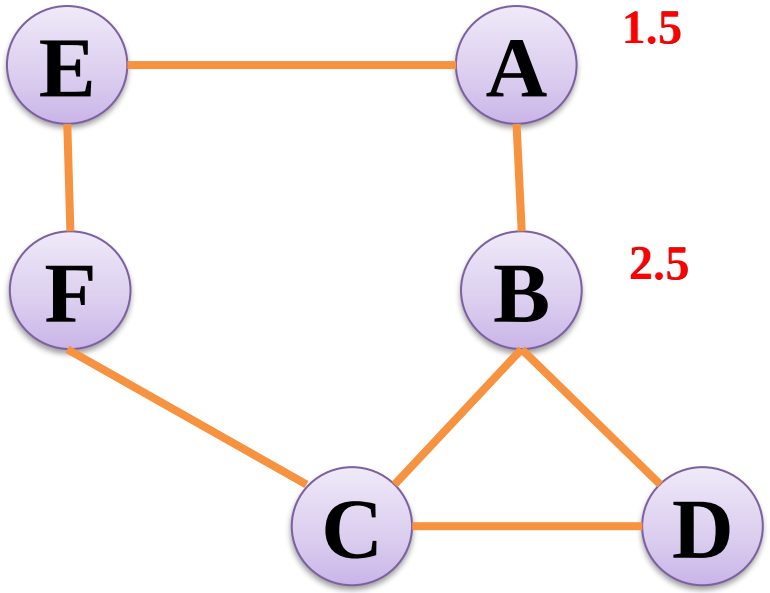
- **AC = 1/1 = 1**
- **AD = 1/1 = 1**
- AE = 0/1 = 0
- AF = 0/1 = 0
- CD = 0/1 = 0
- CE = 0/1 = 0
- CF = 0/1 = 0
- **DE = 1/2 =0.5**
- DF = 0/1 = 0
- EF = 0/1 = 0



Betweenness Centrality for B= 2.5

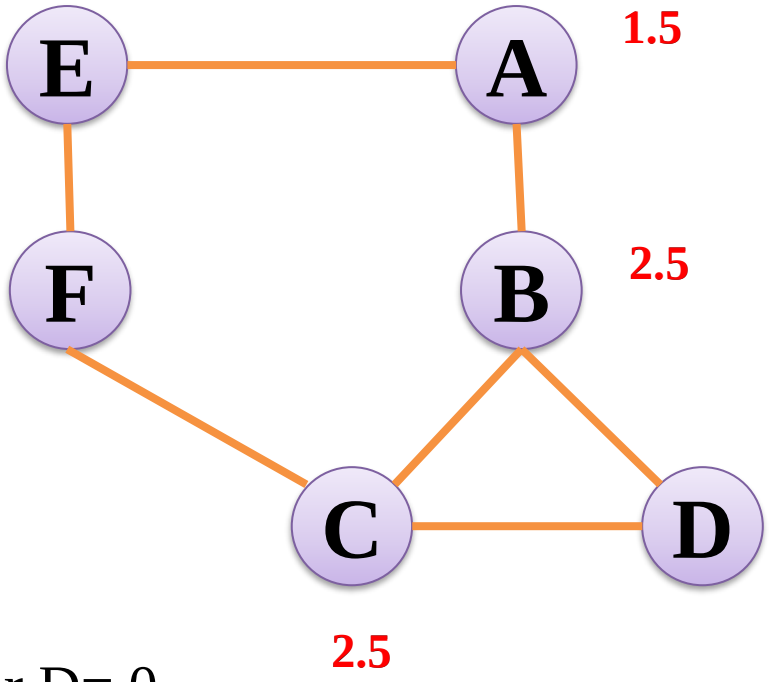
Betweenness Centrality for C= ?

- AB = 0/1 = 0
- AD = 0/1 = 0
- AE = 0/1 = 0
- AF = 0/1 = 0
- BD = 0/1 = 0
- BE = 0/1 = 0
- **BF = 1/1 = 1**
- **DE = 1/2 =0.5**
- **DF = 1/1 = 1**
- EF = 0/1 = 0

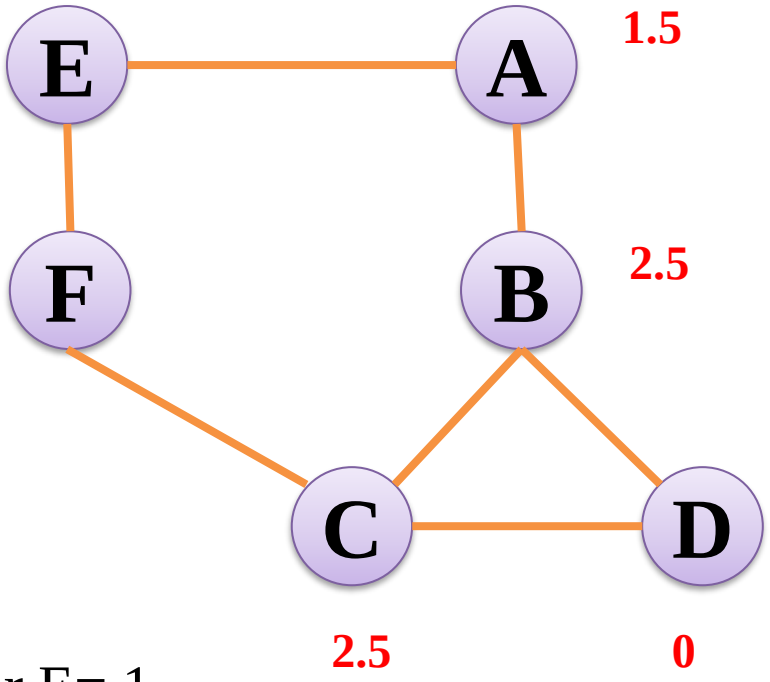


Betweenness Centrality for C= 2.5

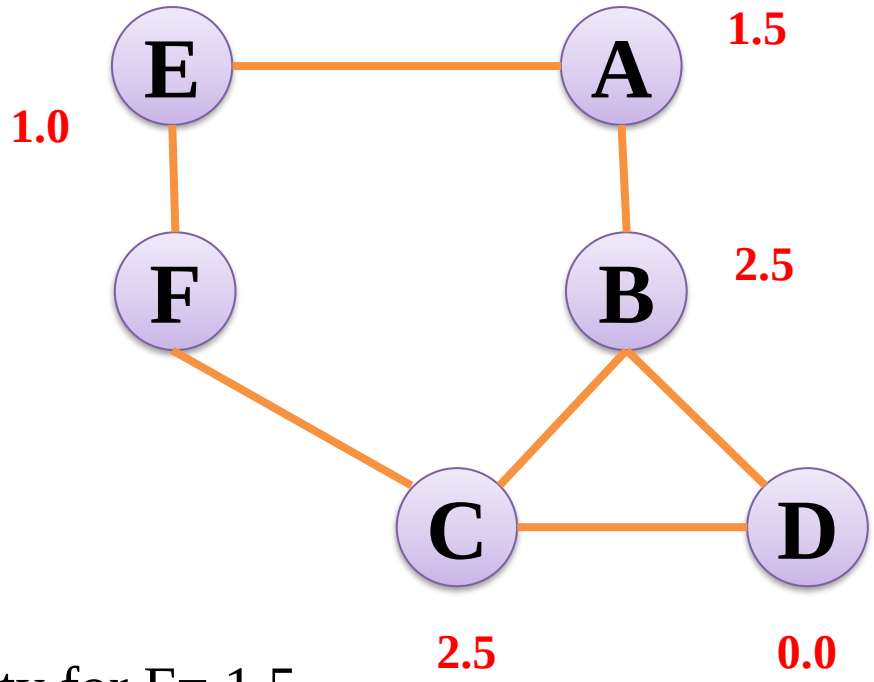
- Betweenness Centrality for D= ?
- AB = 0/1 = 0
- AD = 0/1 = 0
- AE = 0/1 = 0
- AF = 0/1 = 0
- BD = 0/1 = 0
- BE = 0/1 = 0
- BF = 0/1 = 0
- DE = 0/1 =0
- DF = 0/1 = 0
- EF = 0/1 = 0
- Betweenness Centrality for D= 0



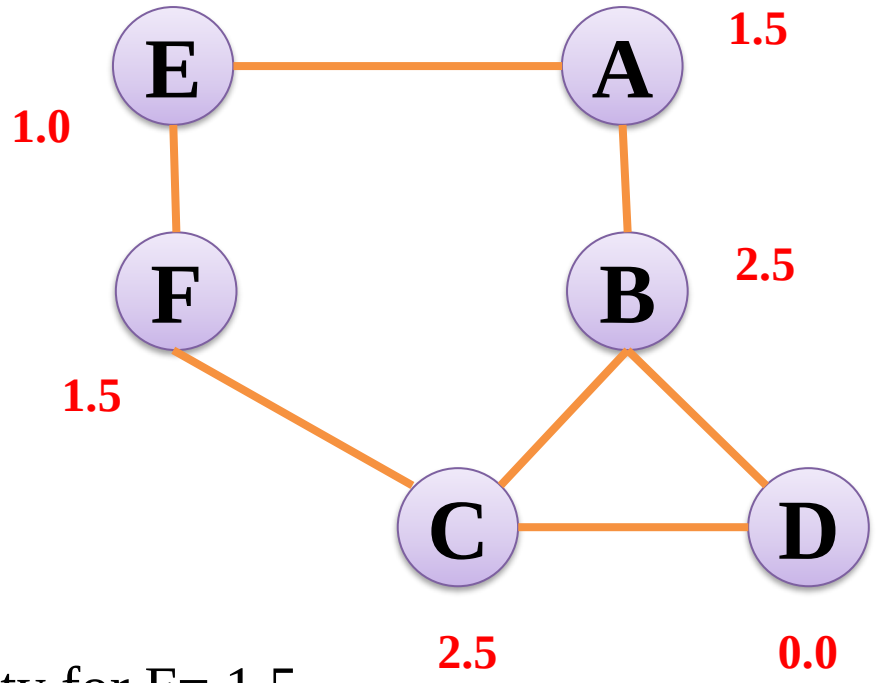
- Betweenness Centrality for E= ?
- AB = 0/1 = 0
- AC = 0/1 = 0
- AD = 0/1 = 0
- **AF = 1/1 = 1**
- BC = 0/1 = 0
- BD = 0/1 = 0
- BF = 0/1 = 0
- CD = 0/1 =0
- CF = 0/1 = 0
- DF = 0/1 = 0
- Betweenness Centrality for E= 1

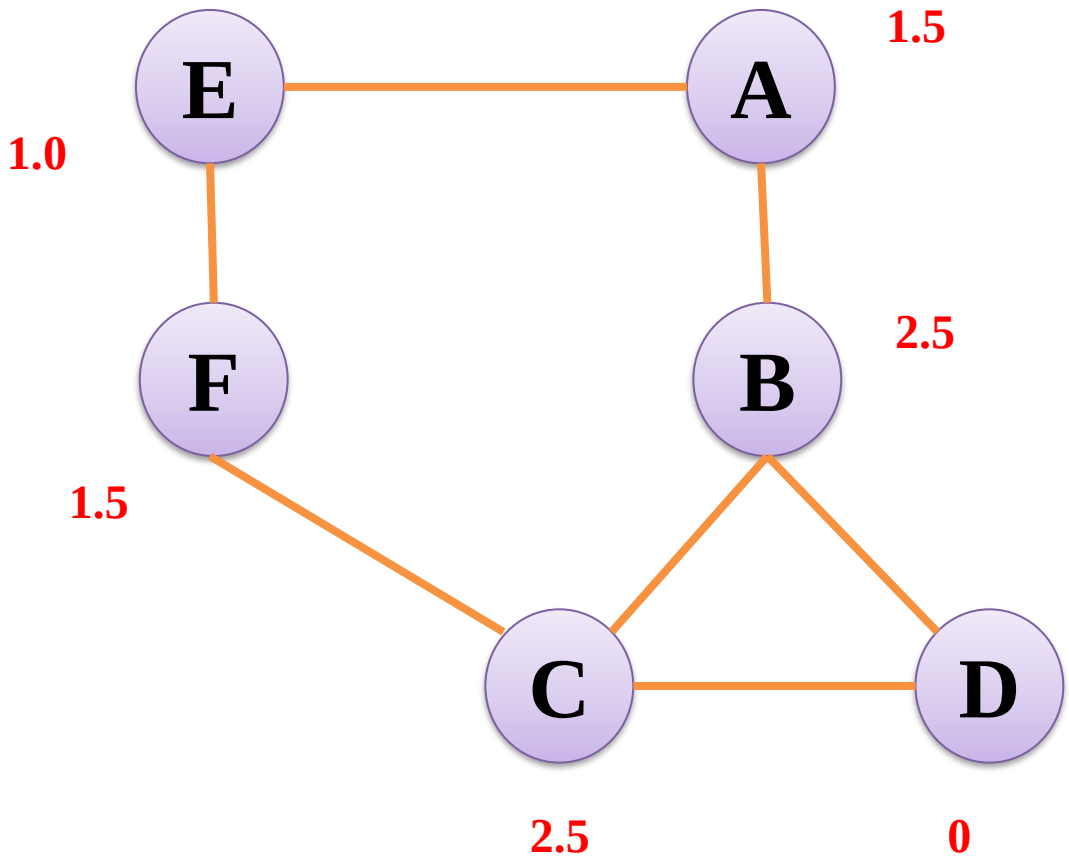


- Betweenness Centrality for F= ?
- AB = 0/1 = 0
- AC = 0/1 = 0
- AD = 0/1 = 0
- AE = 1/1 = 0
- BC = 0/1 = 0
- BD = 0/1 = 0
- BE = 0/1 = 0
- CD = 0/1 =0
- CE = 1/1 = 1
- DE = 1/2 = 0.5
- Betweenness Centrality for F= 1.5



- Betweenness Centrality for F= ?
- AB = 0/1 = 0
- AC = 0/1 = 0
- AD = 0/1 = 0
- AE = 1/1 = 0
- BC = 0/1 = 0
- BD = 0/1 = 0
- BE = 0/1 = 0
- CD = 0/1 =0
- CE = 1/1 = 1
- DE = 1/2 = 0.5
- Betweenness Centrality for F= 1.5




E
A
1.5
1.0
F
B
2.5
1.5
C
D
2.5
0

Thank You