Dijkstra 알고리즘

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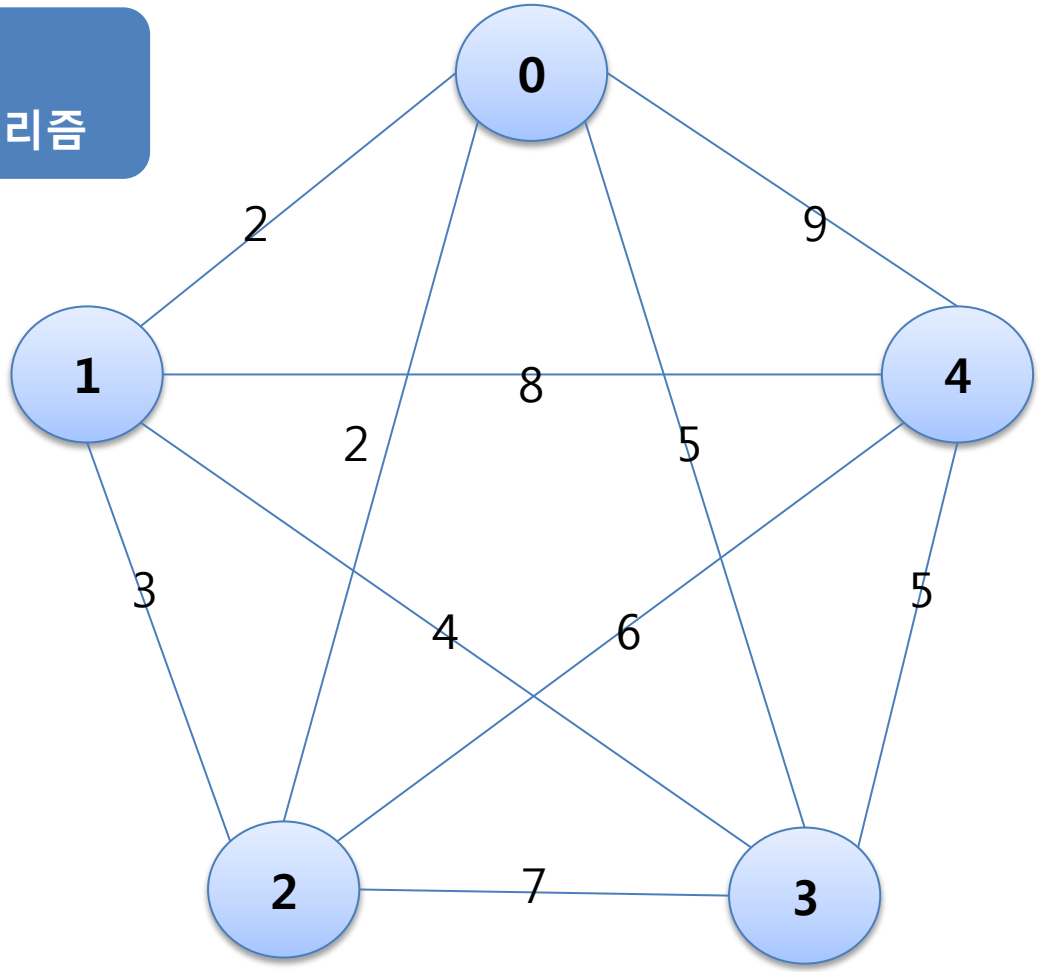
Dijkstra 알고리즘

단일 출발점에서 양의 가중치를 갖는
그래프에서의 최단거리를 구하는 알고리즘



0 에서 4 로 가는
최단거리 찾기

Dijkstra알고리즘-0-a단계

방문하지 않은 정점들의 토탈최소가중치 중 최소 값을 찾은 후 방문 처리

v

f	f	f	f	f

d

0	INF	INF	INF	INF

min : max

j=0->min=0,current=0

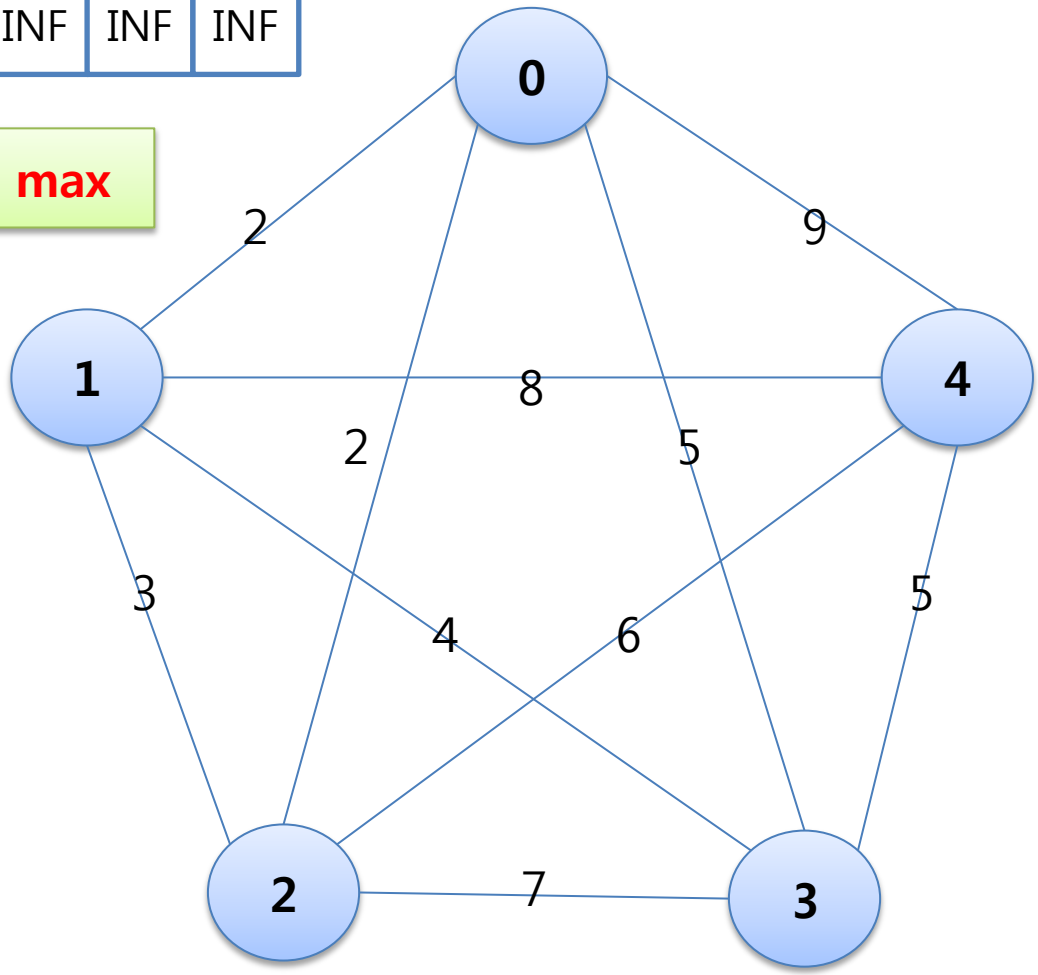
j=1 -> min = 0, current= 0

j=2 -> min = 0, current= 0

j=3 -> min = 0, current= 0

j=4 -> min = 0, current= 0

t	f	f	f	f



Dijkstra알고리즘-0-b단계

방문하지 않은 각 정점들의 토탈최소가중치값을 A단계에서 결정된 다음 방문 정점을 경유했을 때의 가중치와 비교하여 반영

v				
t	f	f	f	f

d				
0	INF	INF	INF	INF

경유정점
current: 0

경유정점까지 토탈최소가중치
min : 0

출발점에서 C까지의 토탈 최소가중치 최소값 반영 시도
min + adj[current][c] < dis[c] 여부 판단

c=0

c=1->0+adj[0][1] <d[1]

2

c=2 -> 0+adj[0][2] < d[2]

2

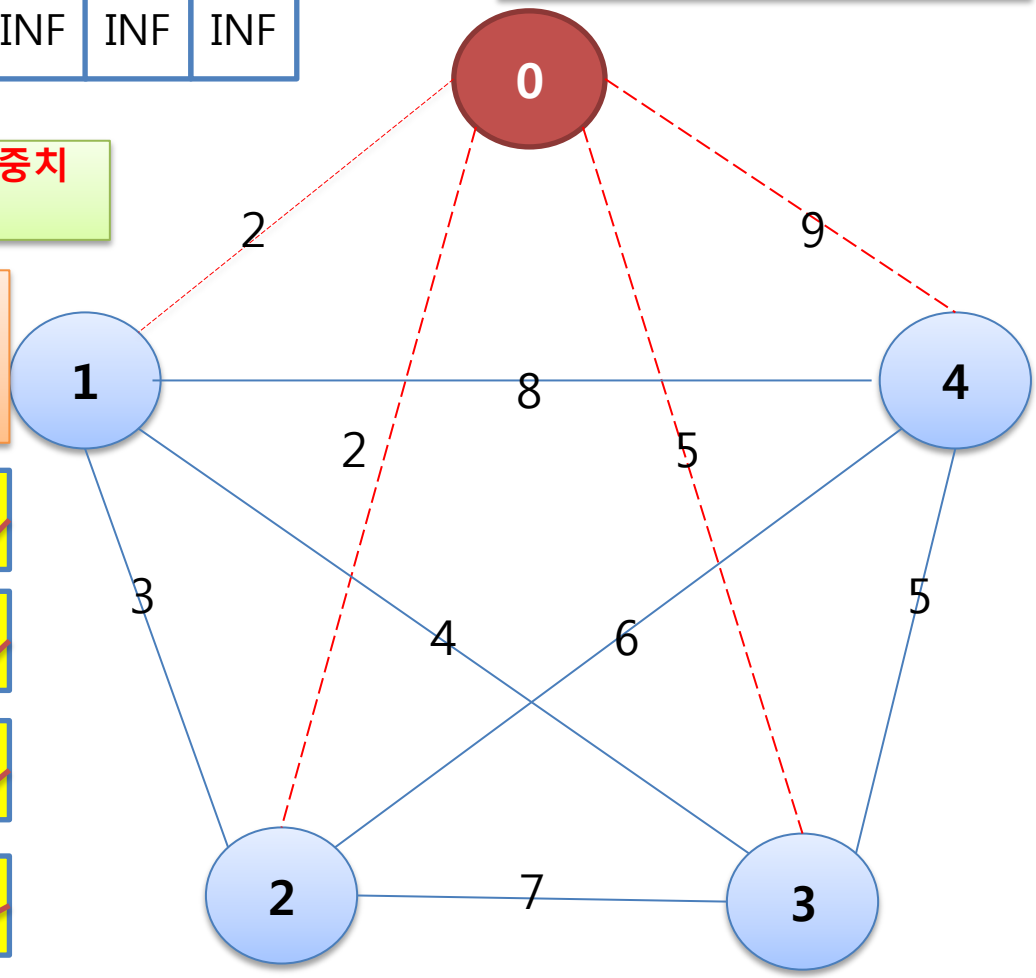
c=3 -> 0+adj[0][3] < d[3]

5

c=4 -> 0+adj[0][4] < d[4]

9

d				
0	2	2	5	9



Dijkstra알고리즘-1-a단계

방문하지 않은 정점들의 토탈최소가중치 중 최소 값을 찾은 후 방문 처리

v

t	f	f	f	f

d

0	2	2	5	9

j=0

min : max

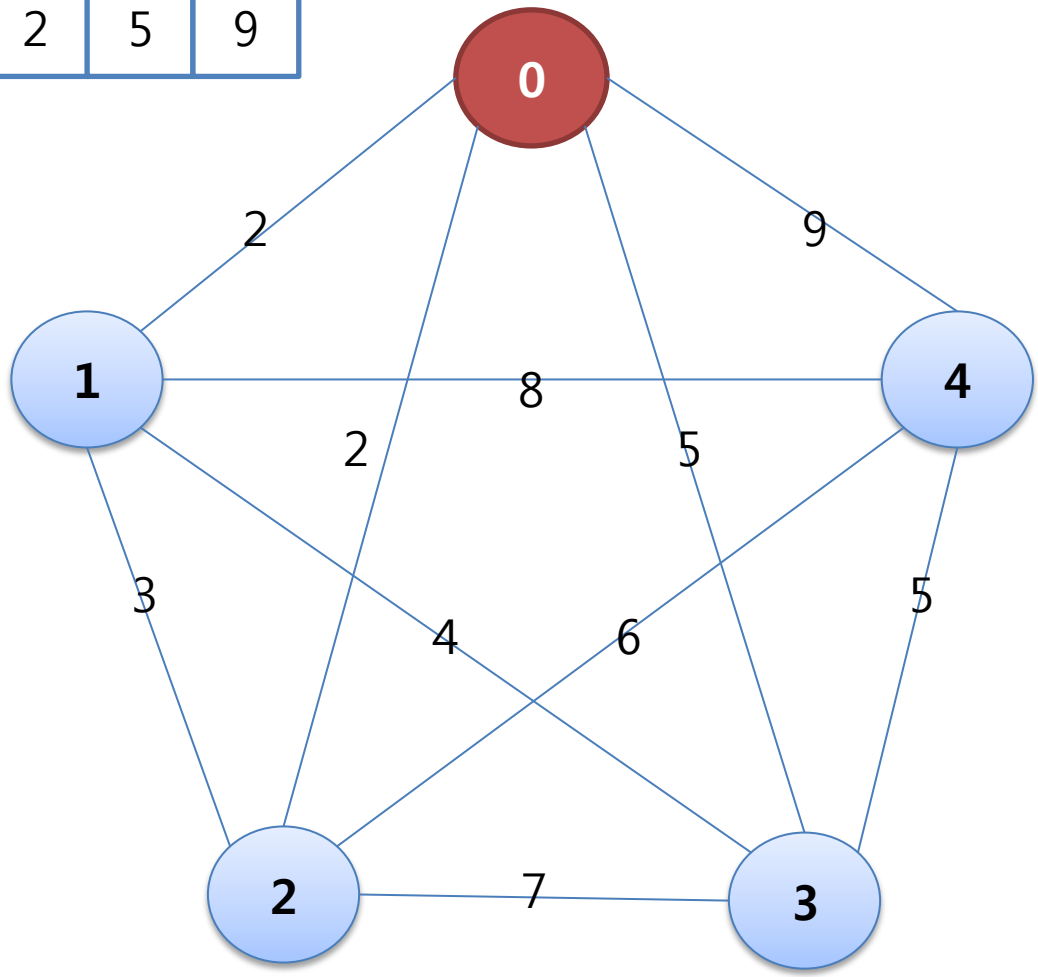
j=1 -> min = 2, current= 1

j=2 -> min = 2, current= 1

j=3 -> min = 2, current= 1

j=4 -> min = 2, current= 1

t	t	f	f	f



Dijkstra알고리즘-1-b단계

방문하지 않은 각 정점들의 토탈최소가중치값을 A단계에서 결정된 다음 방문 정점을 경유했을 때의 가중치와 비교하여 반영

v

t	t	f	f	f

d

0	2	2	5	9

경유정점
current: 1

경유정점까지 토탈최소가중치
min : 2

min + adj[current][c] < dis[c]
여부 판단

c=0

c=1

c=2 -> 2+adj[1][2] < d[2]

3

c=3 -> 2+adj[1][3] < d[3]

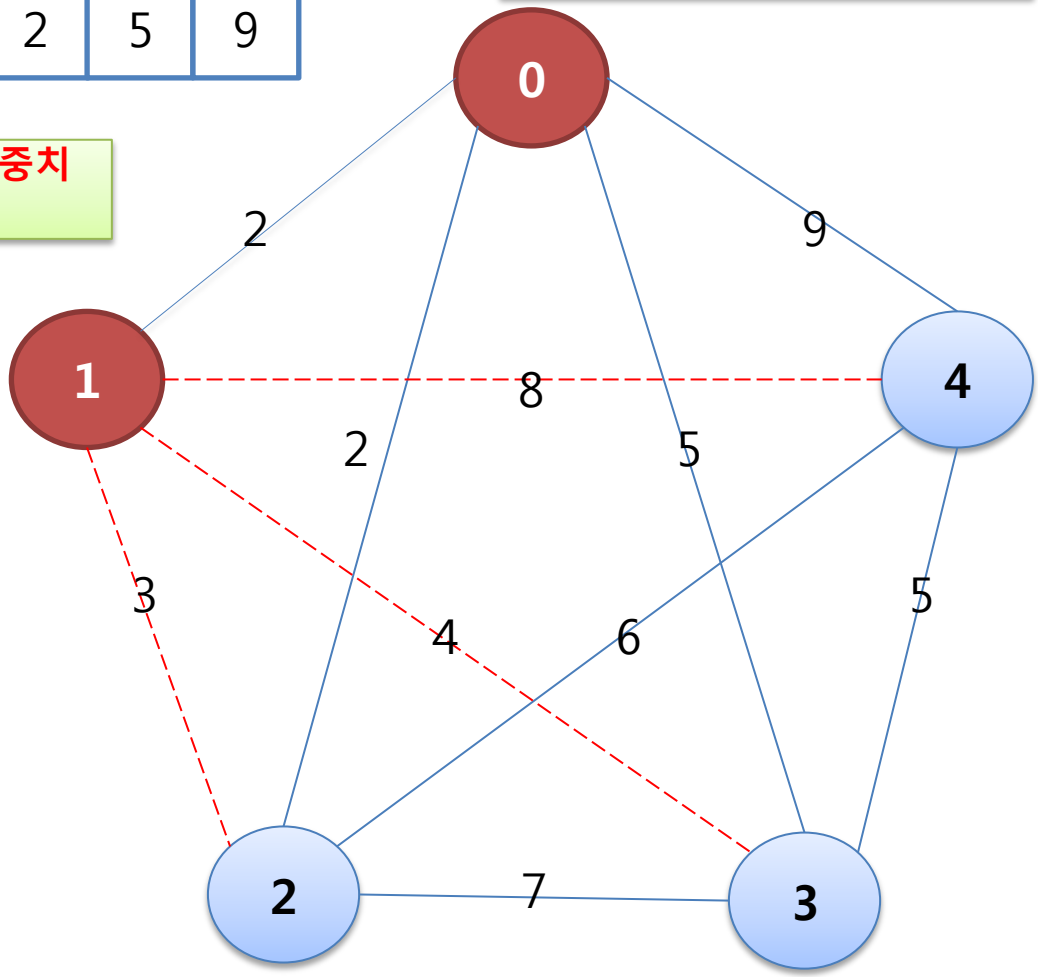
4

c=4 -> 2+adj[1][4] < d[4]

8

d

0	2	2	5	9



Dijkstra알고리즘-2-a단계

방문하지 않은 정점들의 토탈최소가중치 중 최소 값을 찾은 후 방문 처리

v

t	t	f	f	f

d

0	2	2	5	9

j=0

min : max

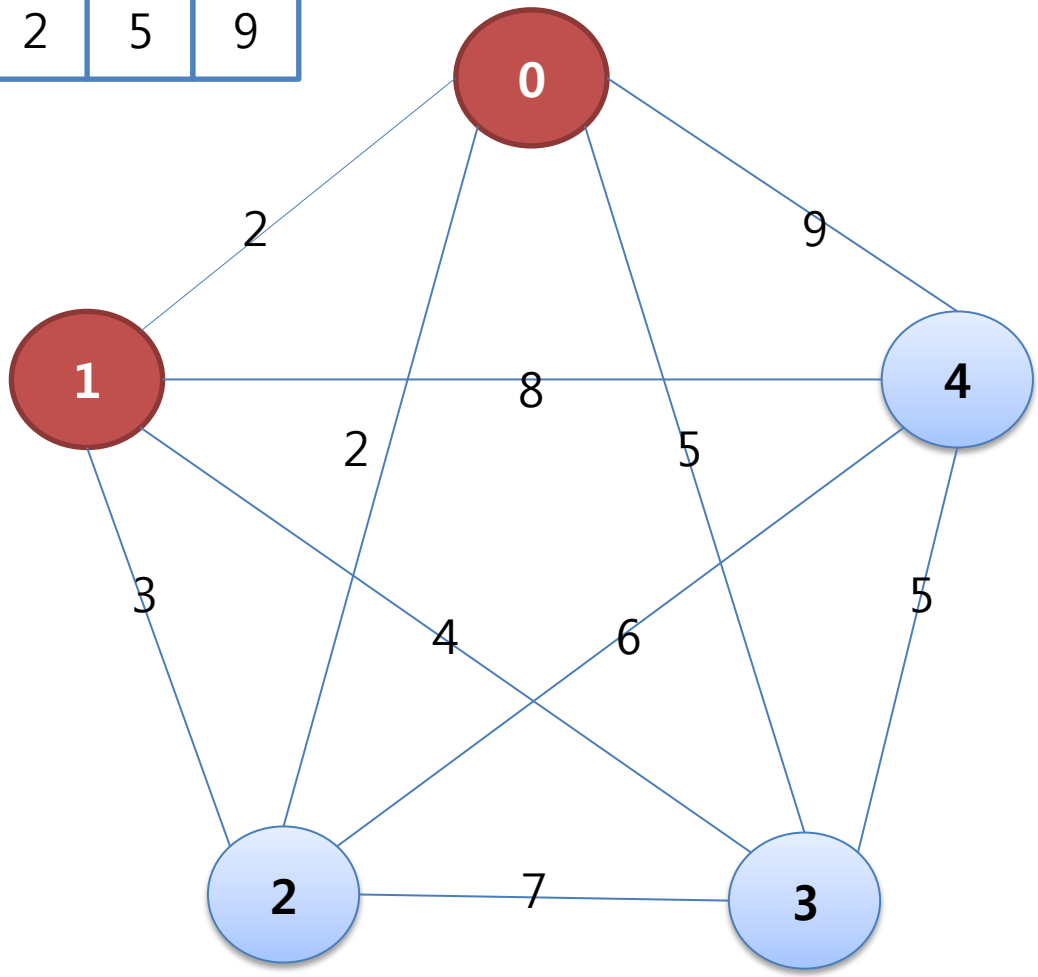
j=1

j=2 -> min = 2, current= 2

j=3 -> min = 2, current= 2

j=4 -> min = 2, current= 2

t	t	t	f	f



Dijkstra알고리즘-2-b단계

방문하지 않은 각 정점들의 토탈최소가중치값을 A단계에서 결정된 다음 방문 정점을 경유했을 때의 가중치와 비교하여 반영

v

t	t	t	f	f

d

0	2	2	5	9

경유정점
current: 2

경유정점까지 토탈최소가중치
min : 2

min + adj[current][c] < dis[c]
여부 판단

c=0 | c=1 | c=2

c=3 -> 2+adj[2][3] < d[3]

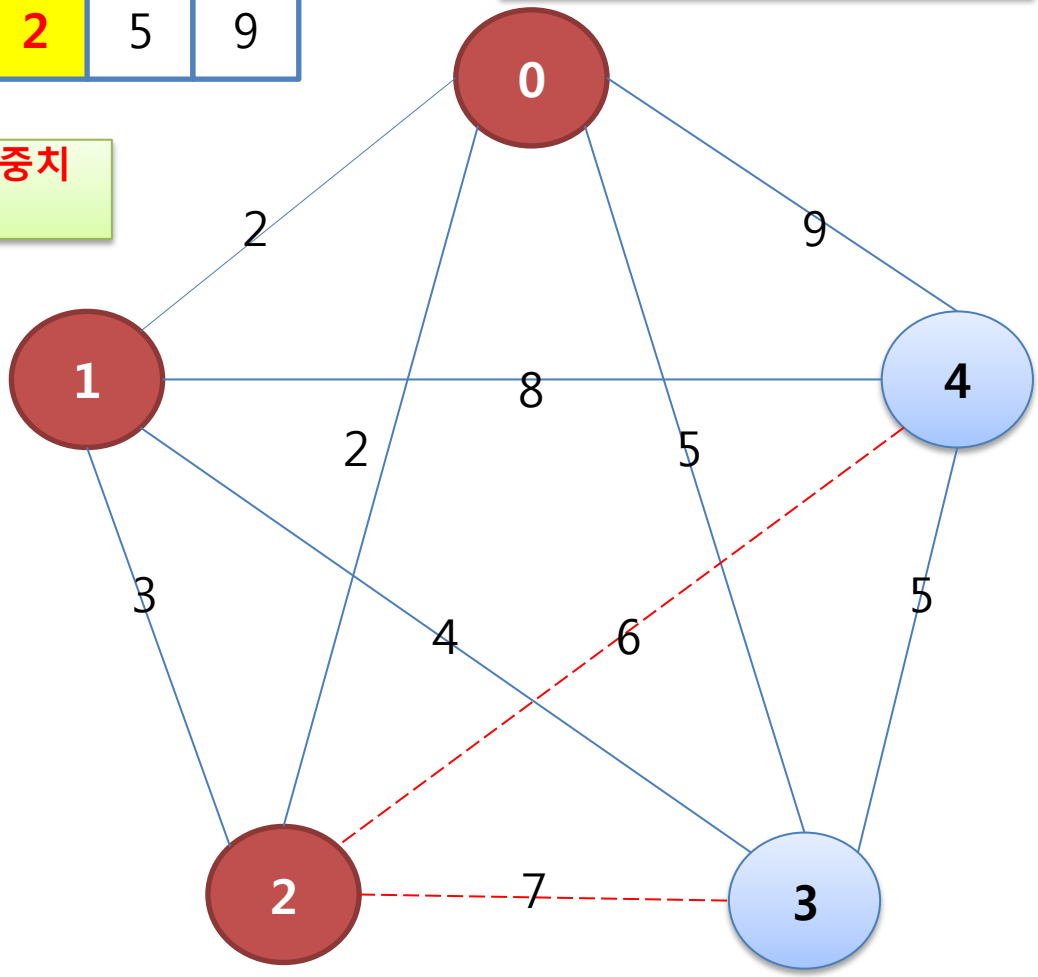
7

c=4 -> 2+adj[2][4] < d[4]

6

d

0	2	2	5	8



Dijkstra알고리즘-3-a단계

방문하지 않은 정점들의 토탈최소가중치 중 최소 값을 찾은 후 방문 처리

v

t	t	t	f	f

d

0	2	2	5	8

j=0

min : max

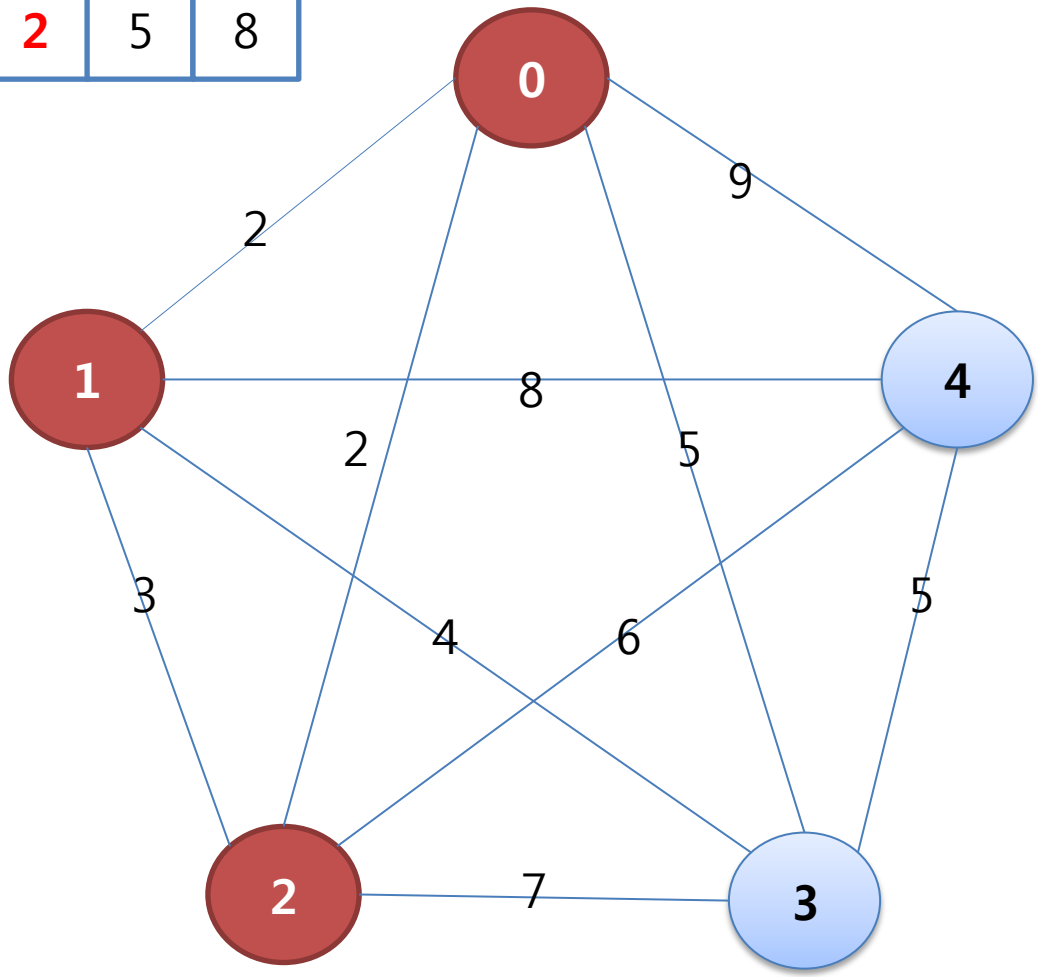
j=1

j=2

j=3 -> min = 5, current= 3

j=4 -> min = 5, current= 3

t	t	t	t	f



Dijkstra알고리즘-3-b단계

방문하지 않은 각 정점들의 토탈최소가중치값을 A 단계에서 결정된 다음 방문 정점을 경유했을 때의 가중치와 비교하여 반영

v

t	t	t	t	f

d

0	2	2	5	8

경유정점
current: 3

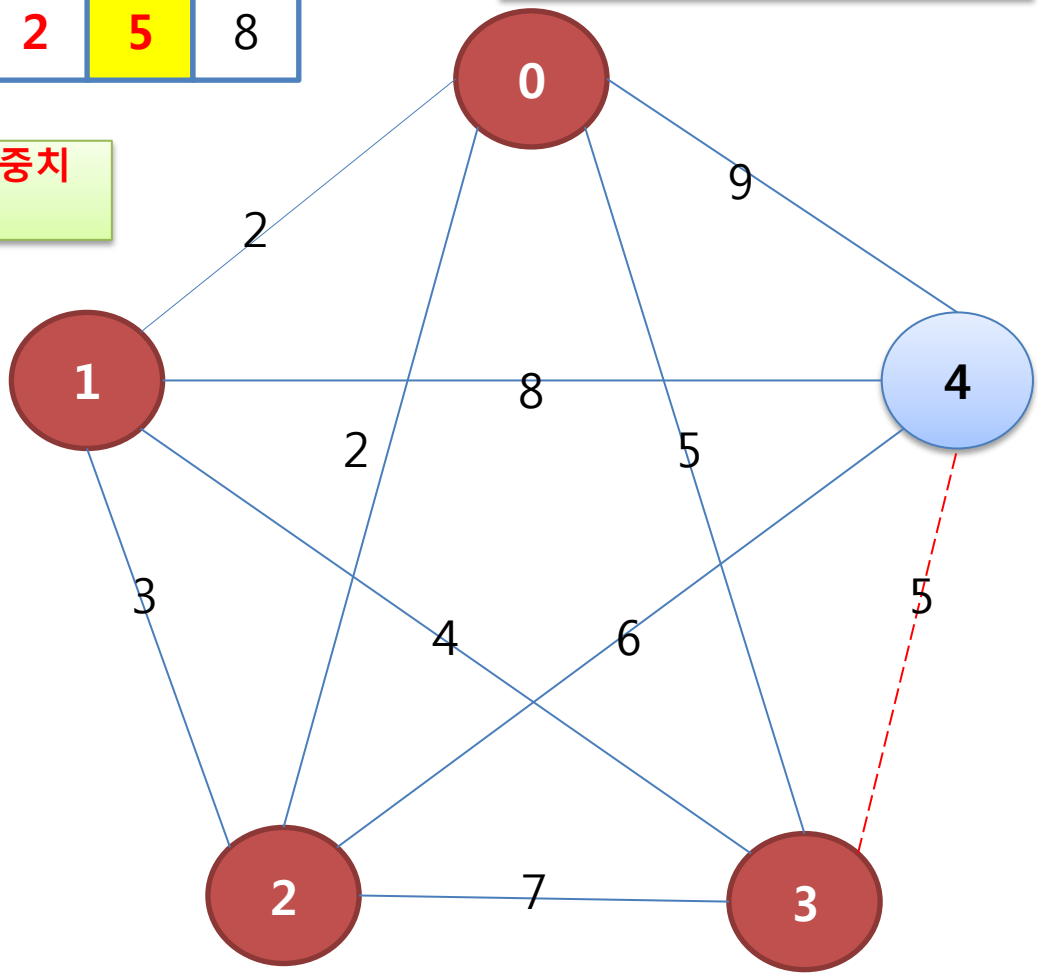
경유정점까지 토탈최소가중치
min : 5

min + adj[current][c] < dis[c]
여부 판단

c=0 c=1 c=2

c=3

c=4 -> 5+adj[3][4] < d[4]
5



d

0	2	2	5	8

Dijkstra알고리즘-4-a단계

방문하지 않은 정점들의 토탈최소가중치 중 최소 값을 찾은 후 방문 처리

v

t	t	t	t	f

d

0	2	2	5	8

j=0

min : max

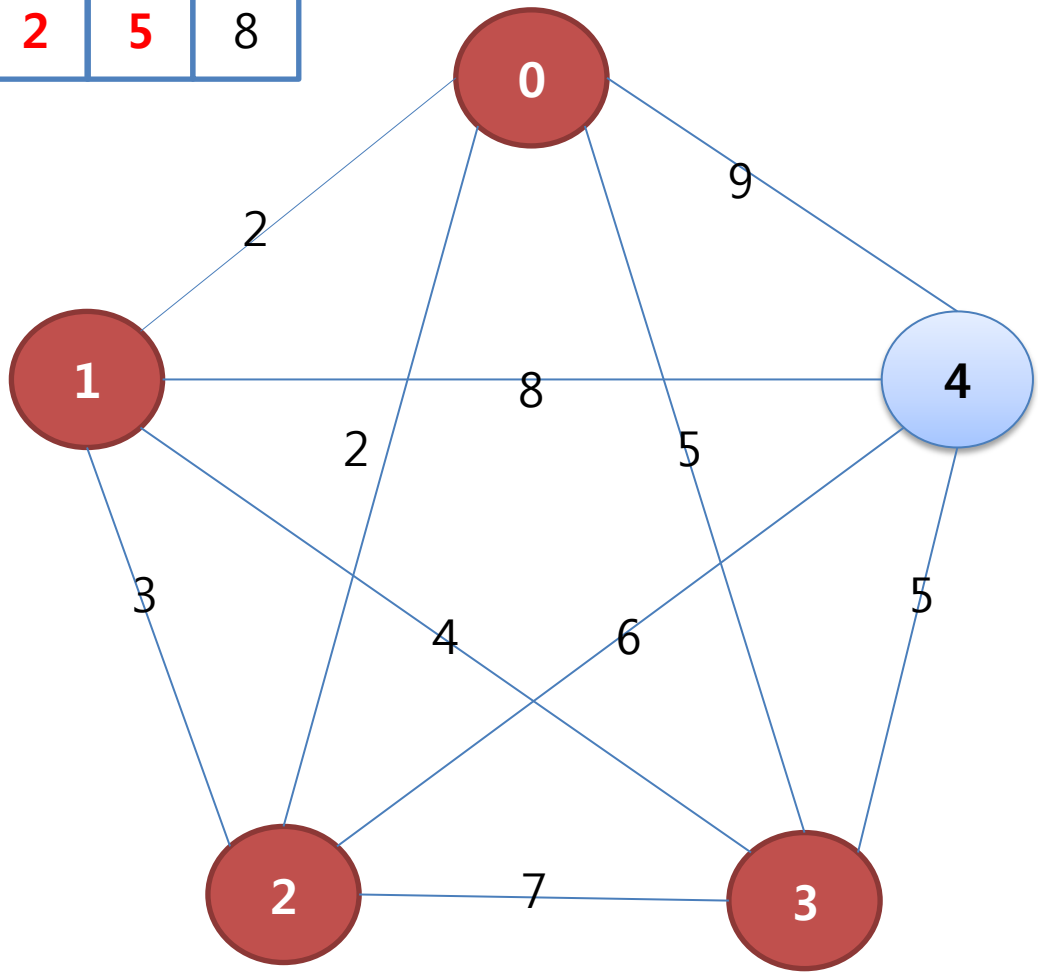
j=1

j=2

j=3

j=4 -> min = 8, current= 4

t	t	t	t	t



Dijkstra알고리즘-4-b단계

방문하지 않은 각 정점들의 토탈최소가중치값을 A단계에서 결정된 다음 방문 정점을 경유했을 때의 가중치와 비교하여 반영

v

t	t	t	t	t

d

0	2	2	5	8

경유정점
current: 4

경유정점까지 토탈최소가중치
min : 8

min + adj[current][c] < dis[c]
여부 판단

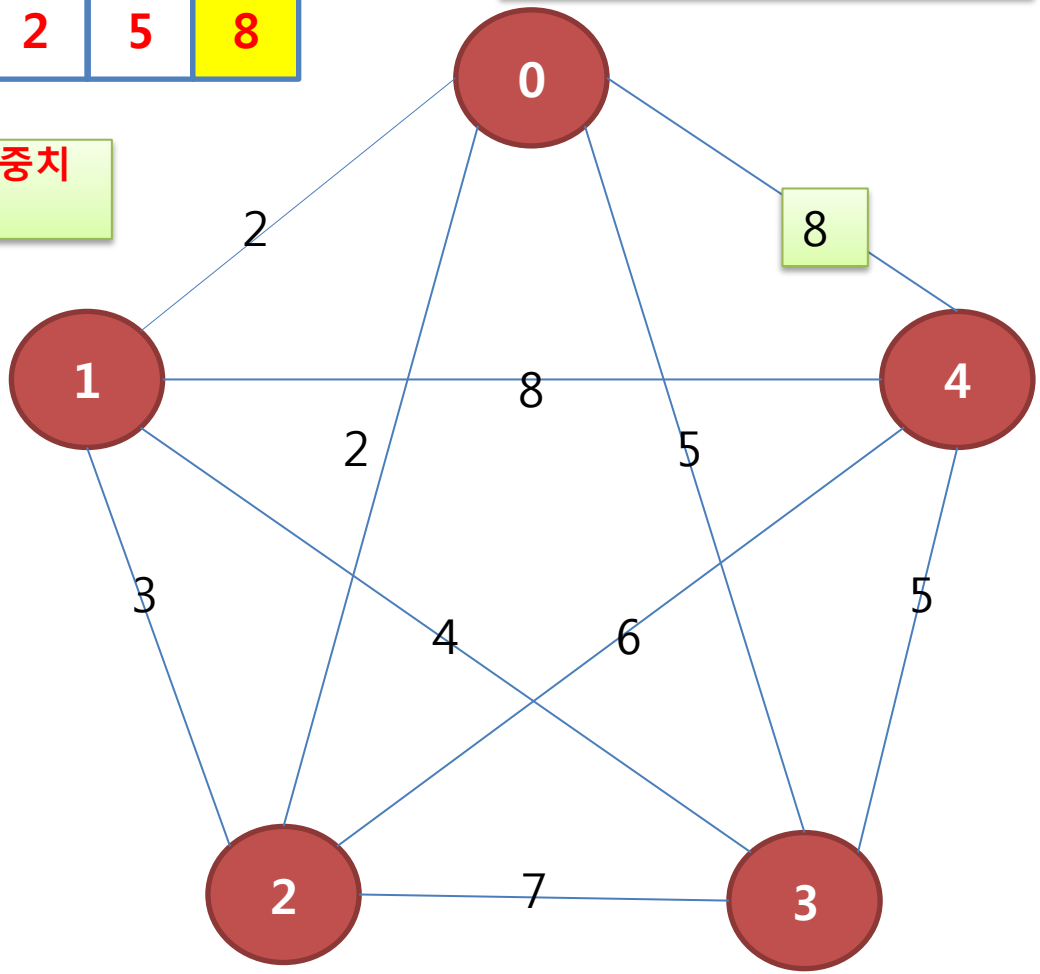
c=0

c=1

c=2

c=3

c=4



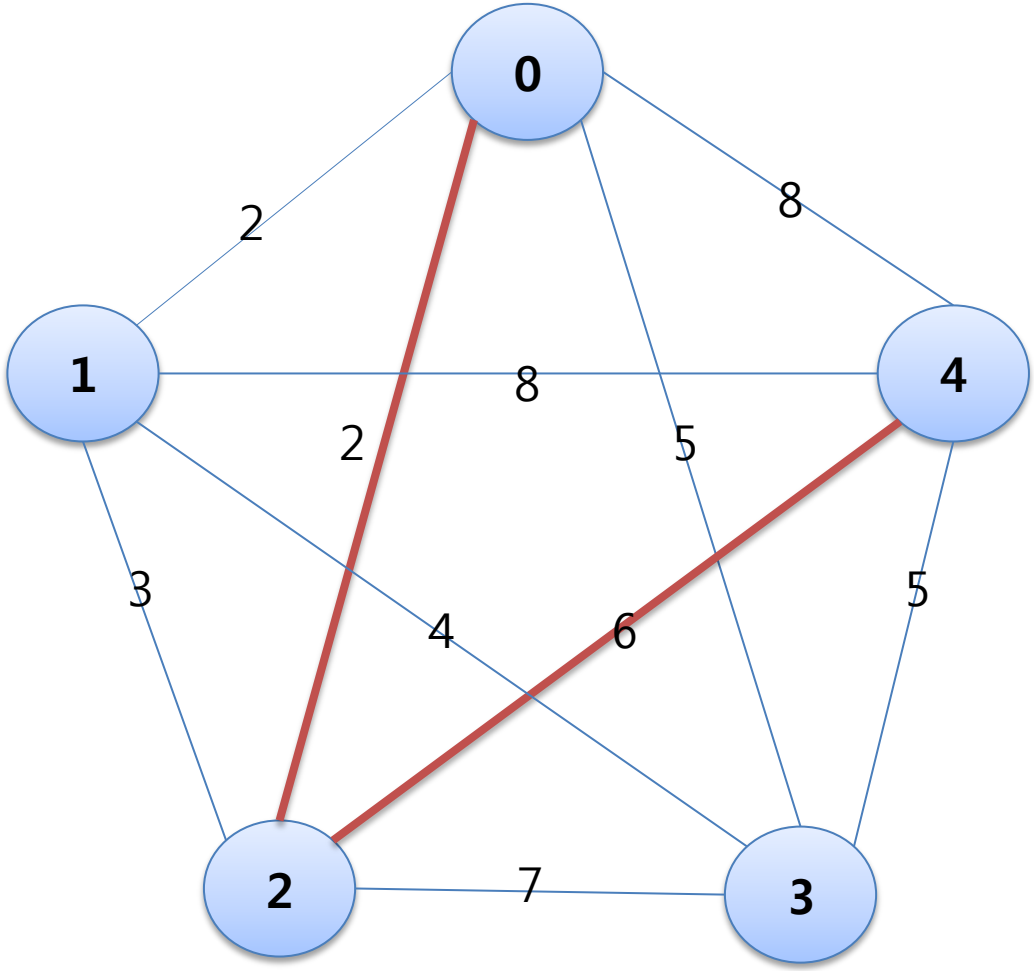
d

0	2	2	5	8

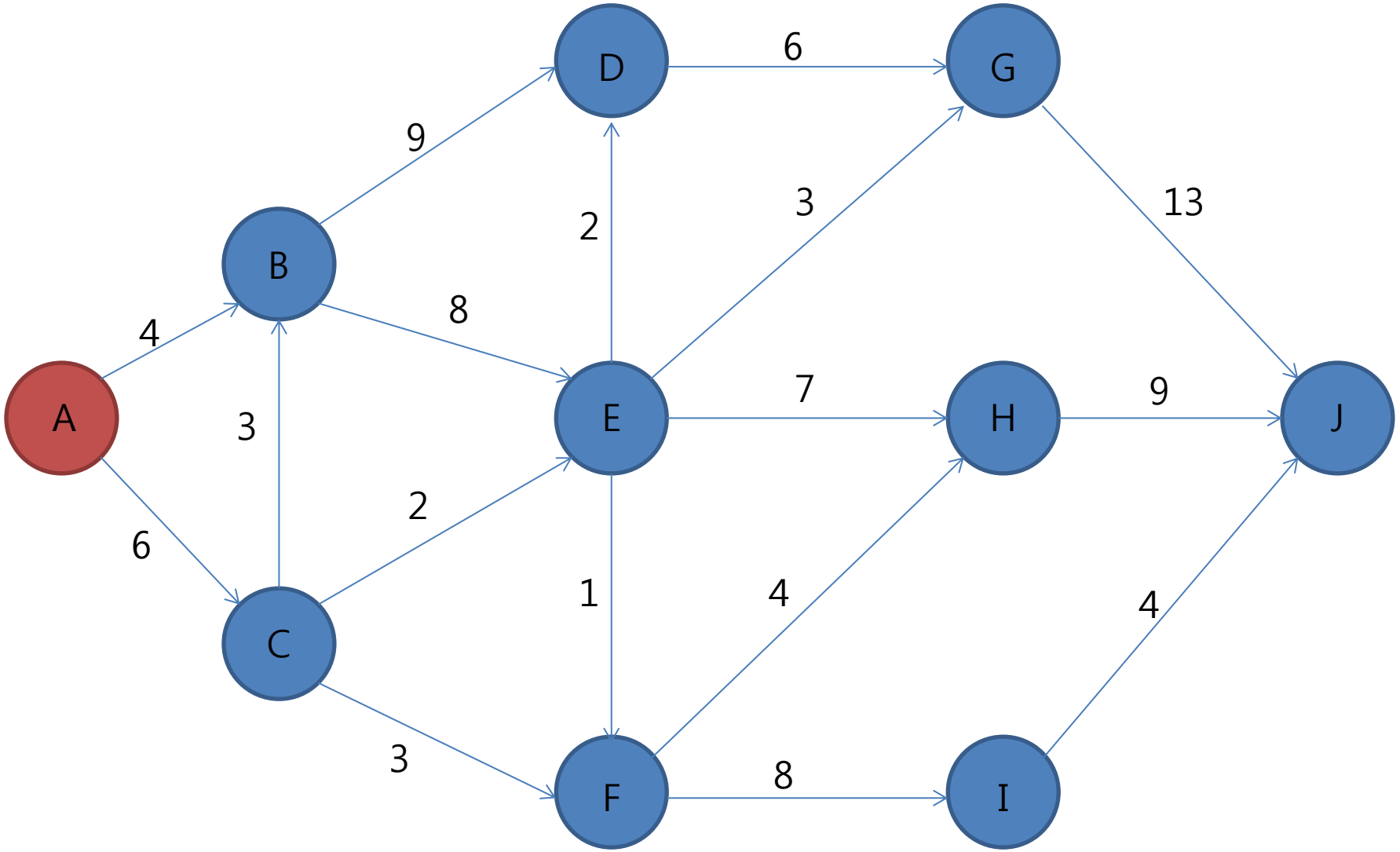
Dijkstra알고리즘-완성

d	0	2	2	5	8

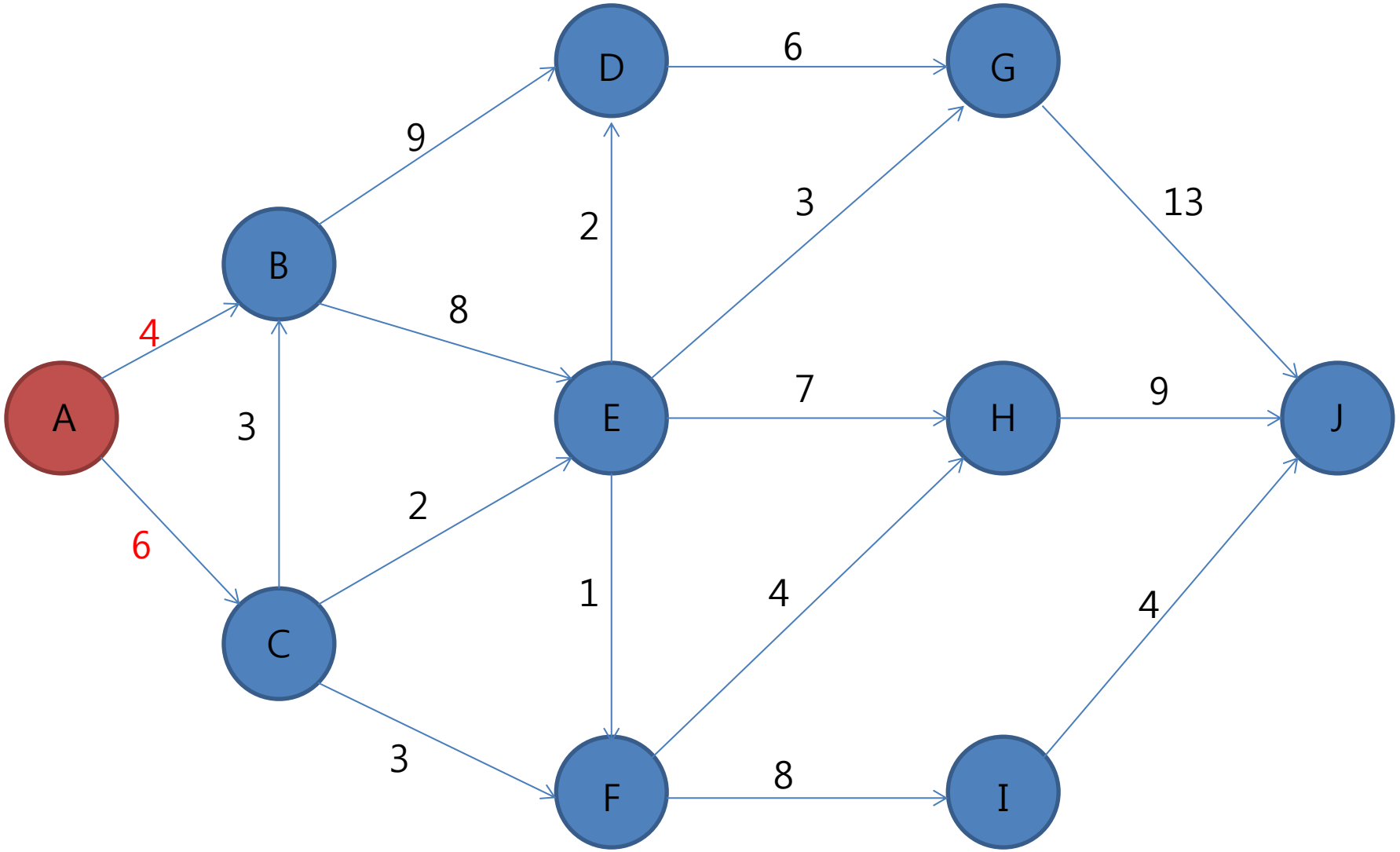
최단거리 : 8



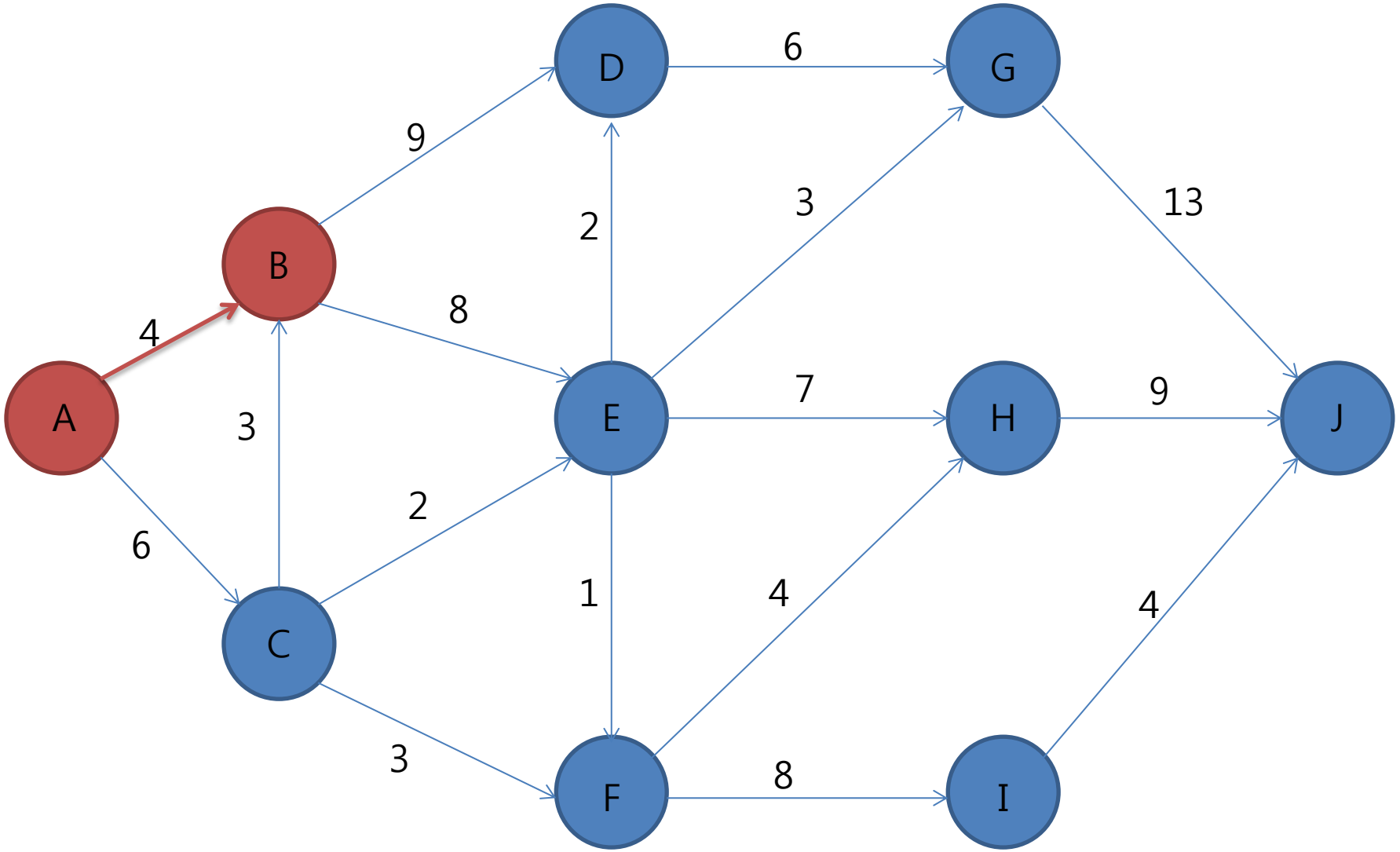
Simulation example



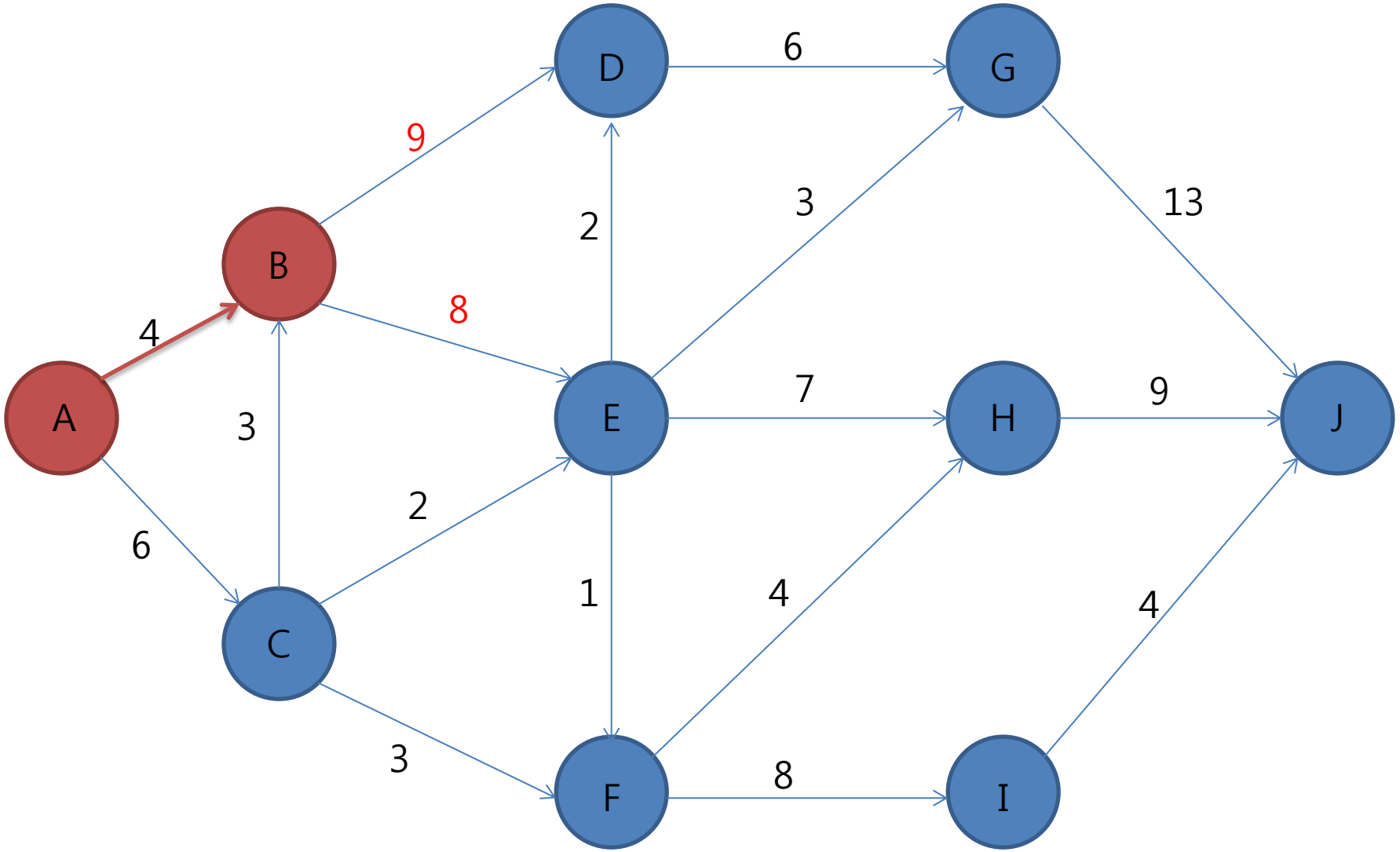
Min	A	B	C	D	E	F	G	H	I	J
	0	X	X	X	X	X	X	X	X	X



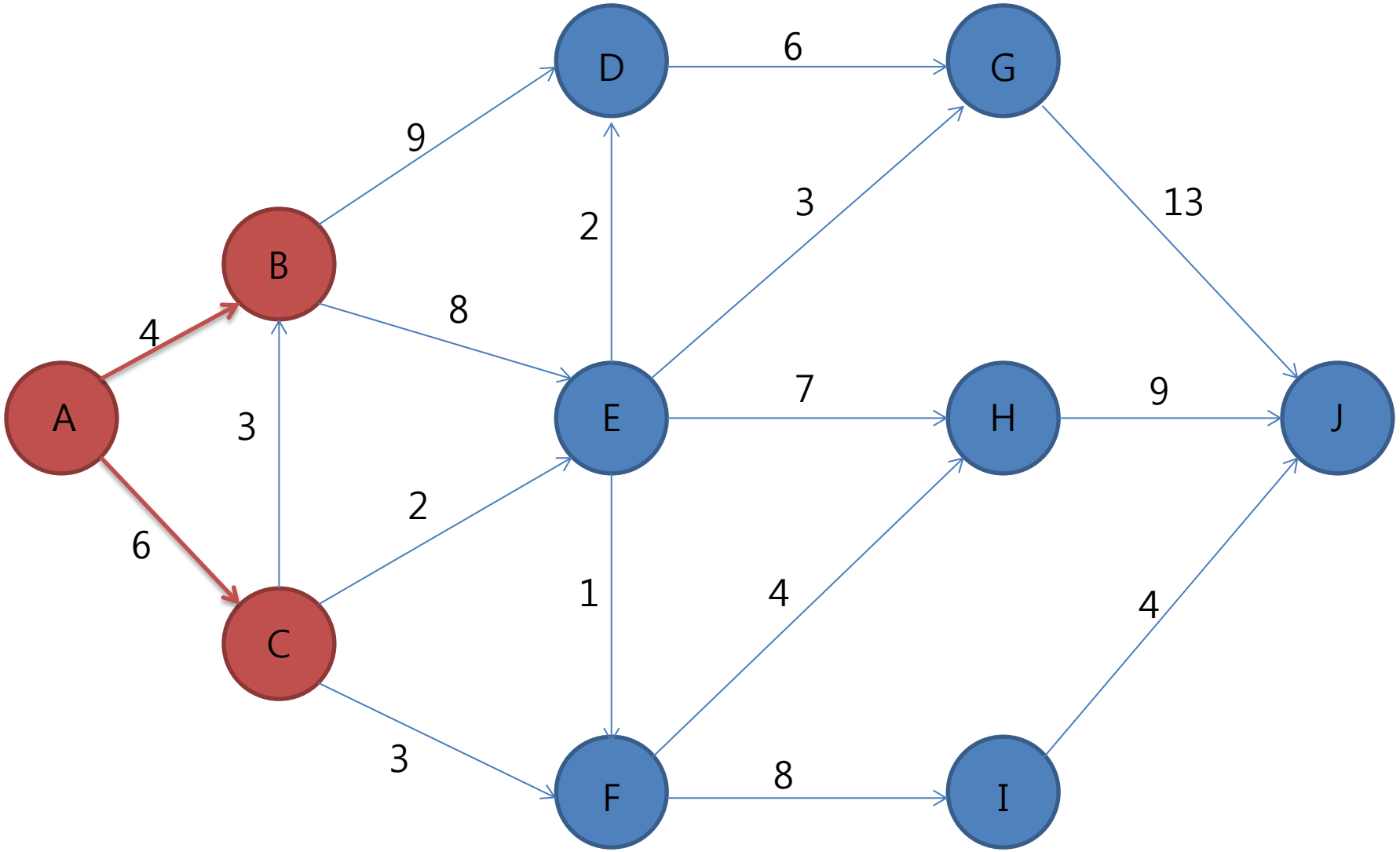
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	X	X	X	X	X	X	X



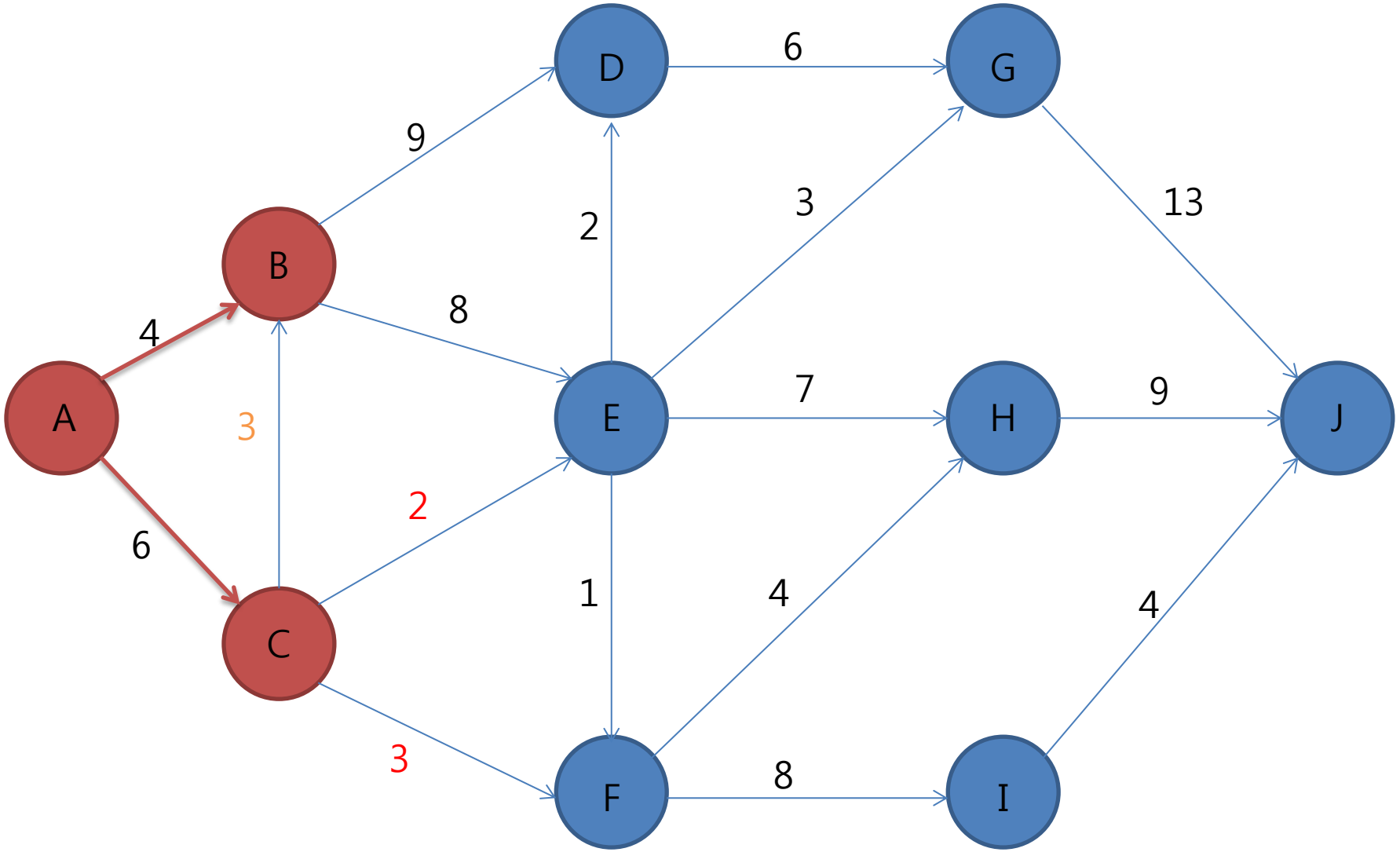
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	X	X	X	X	X	X	X



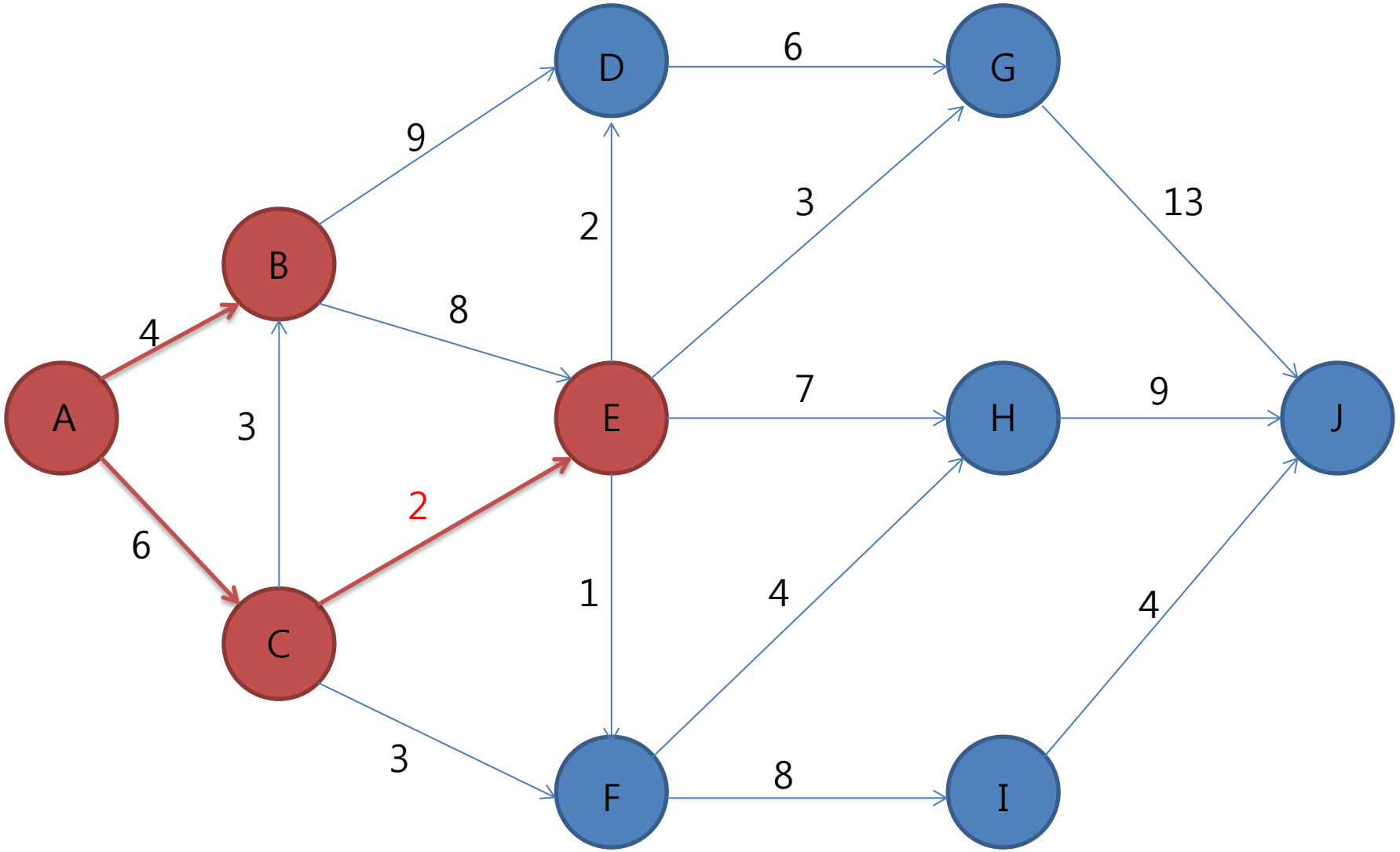
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	13	12	X	X	X	X	X



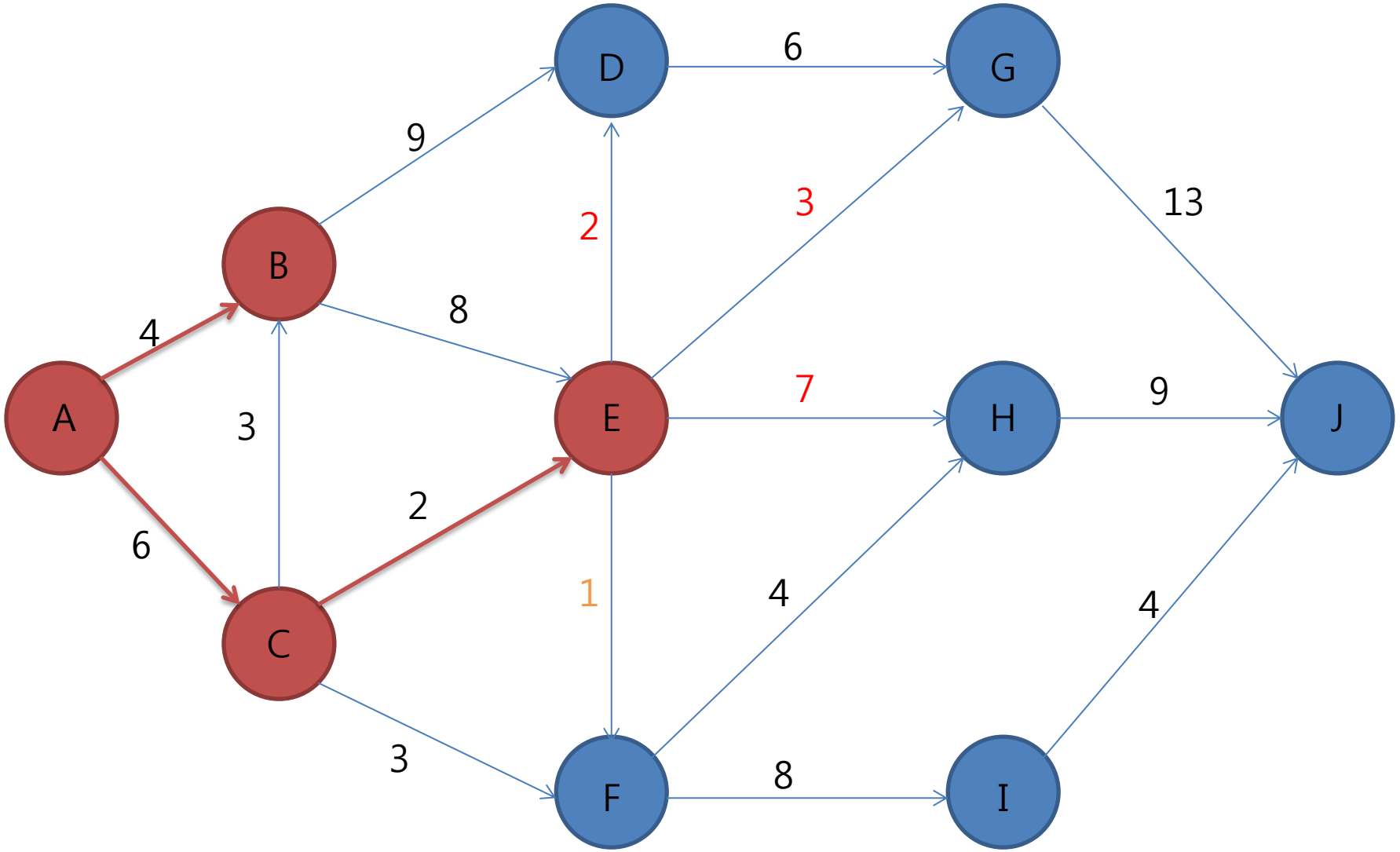
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	13	12	X	X	X	X	X



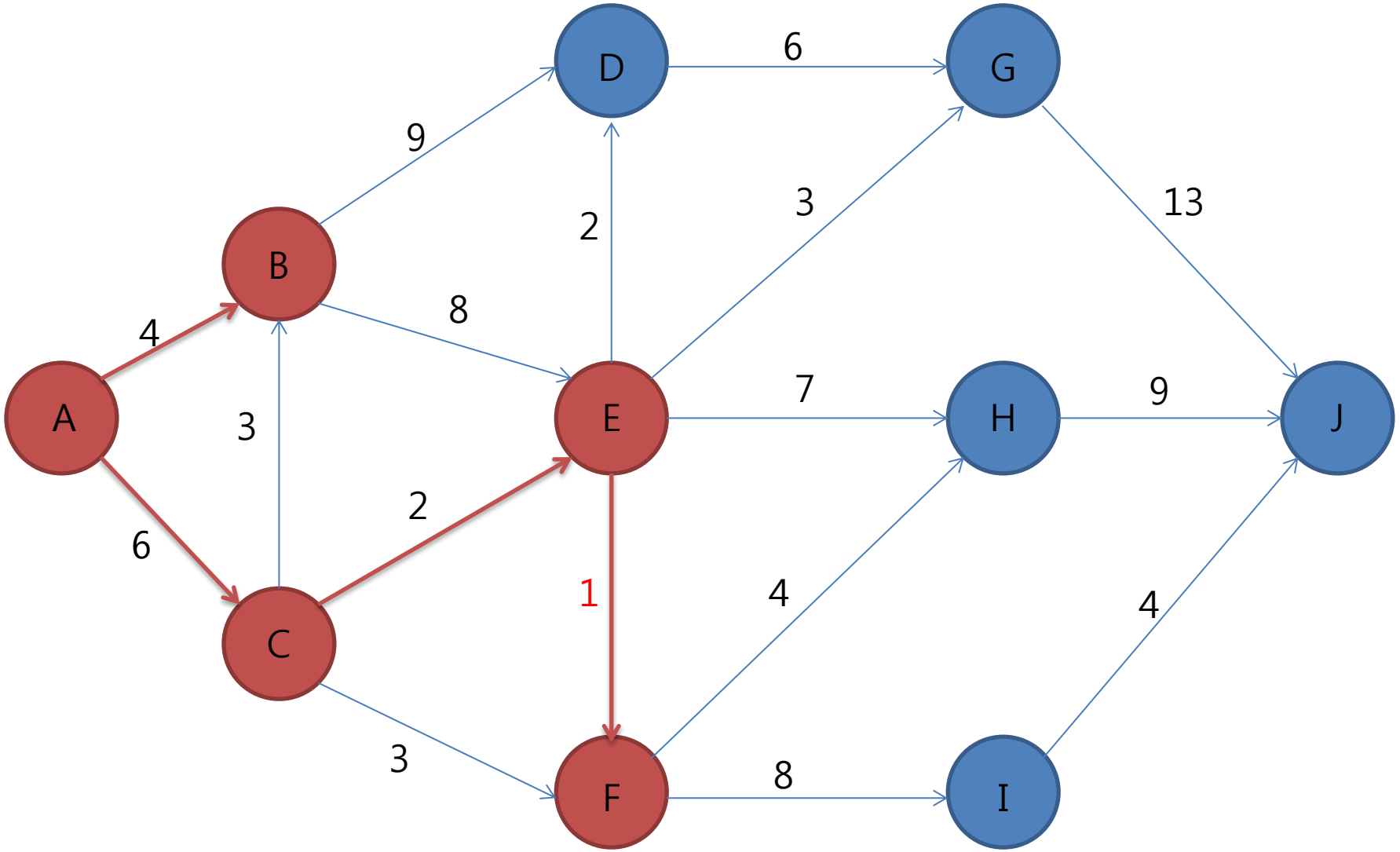
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	13	8	9	X	X	X	X



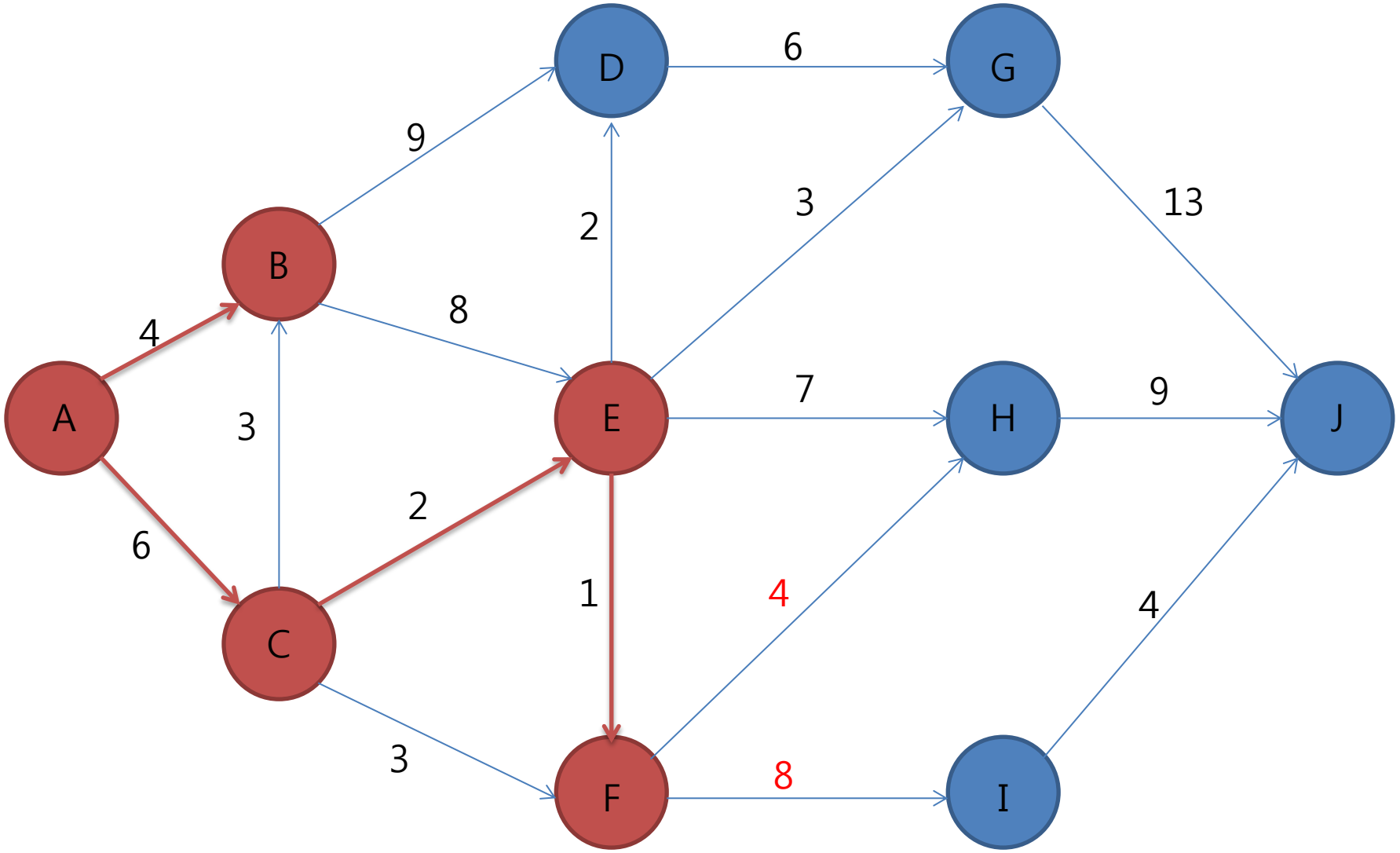
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	13	8	9	X	X	X	X



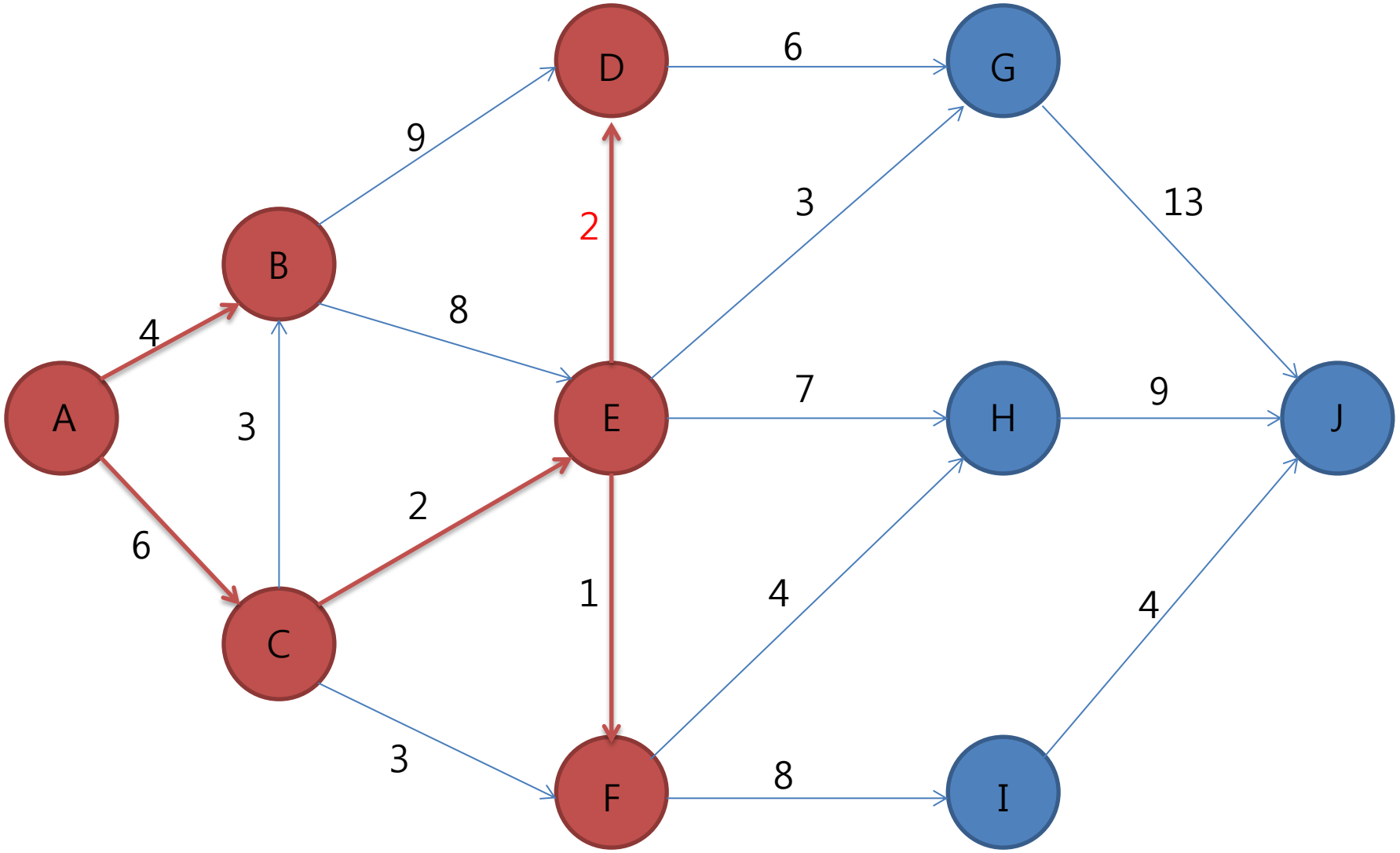
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	15	X	X



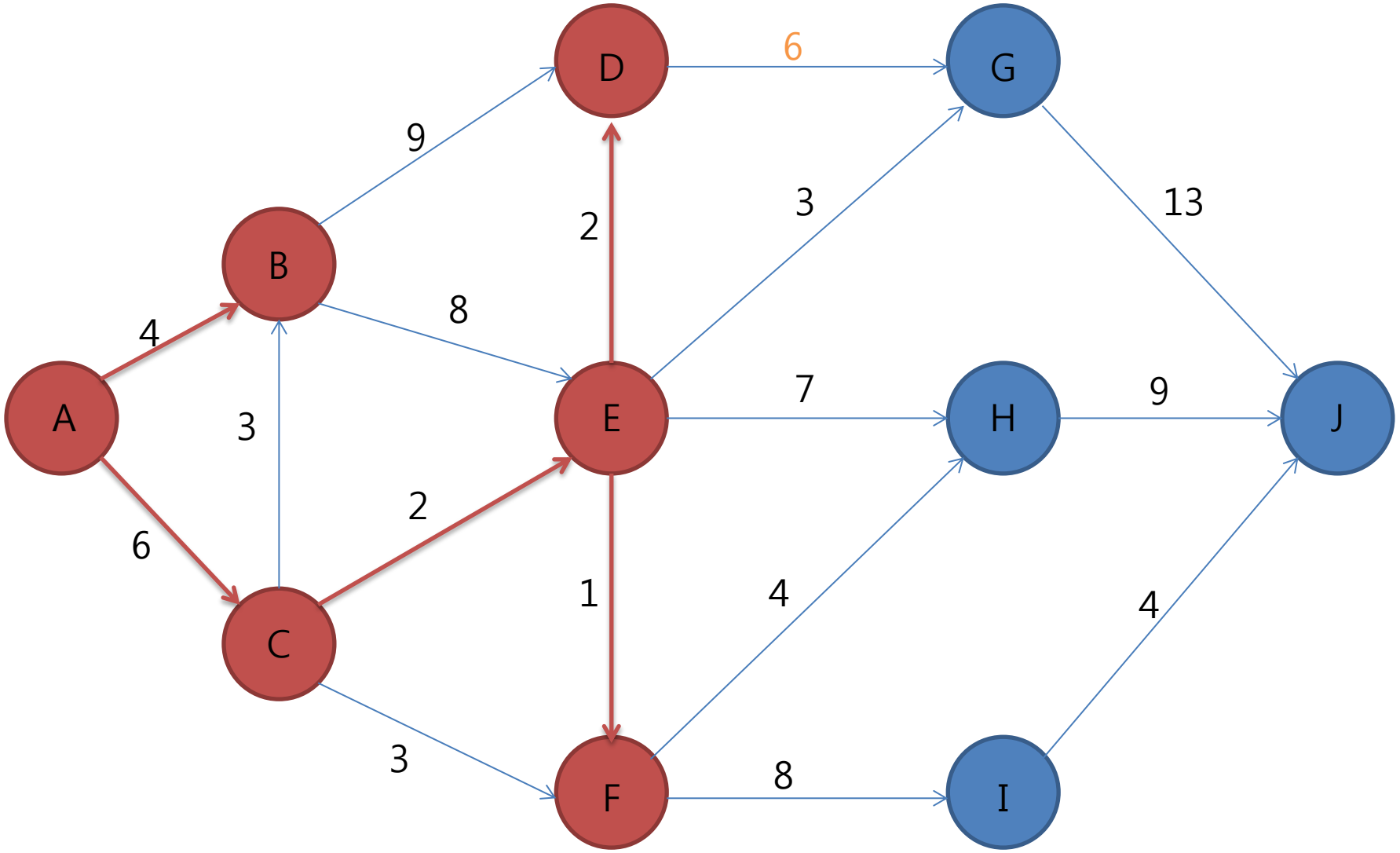
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	15	X	X



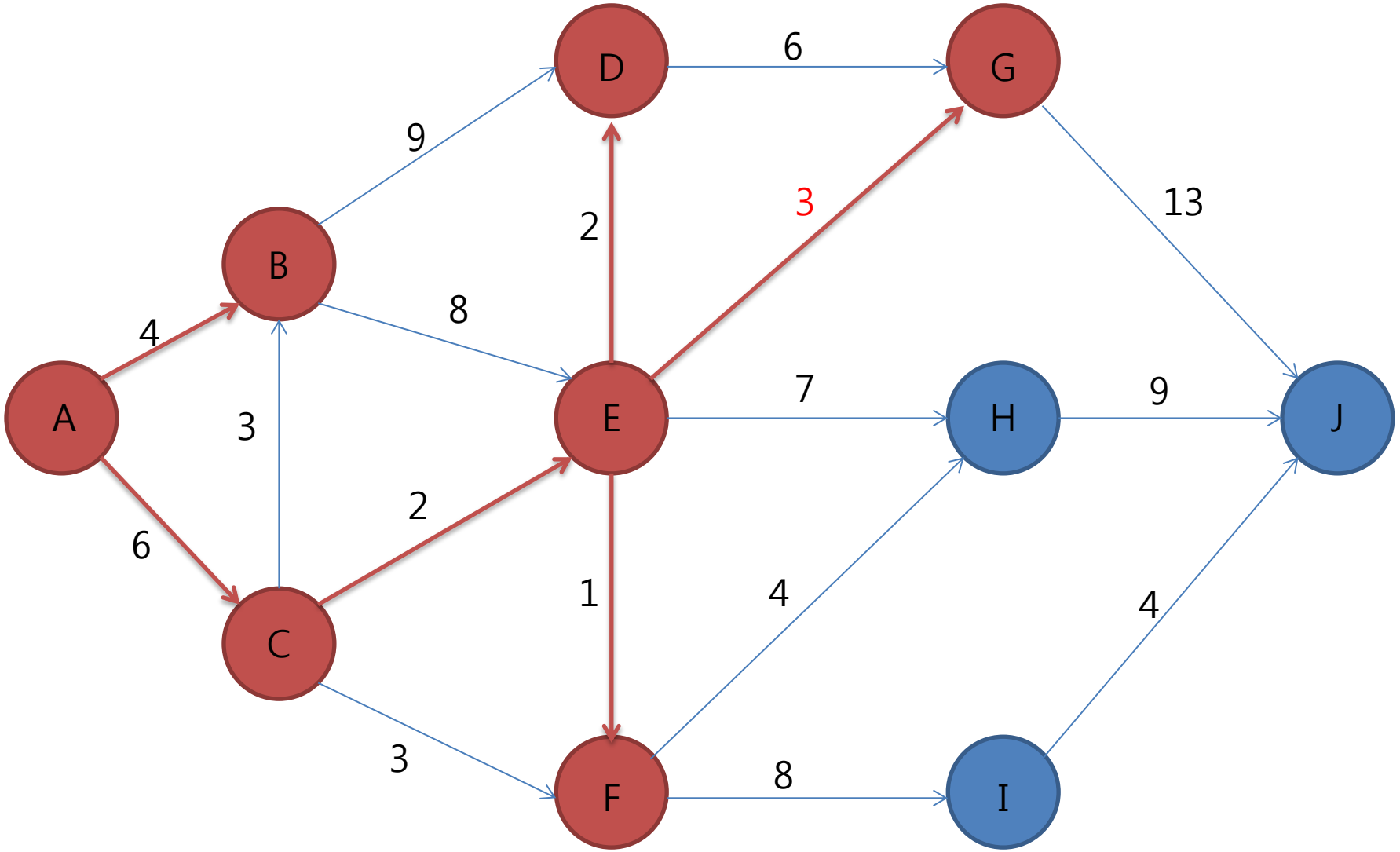
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	X



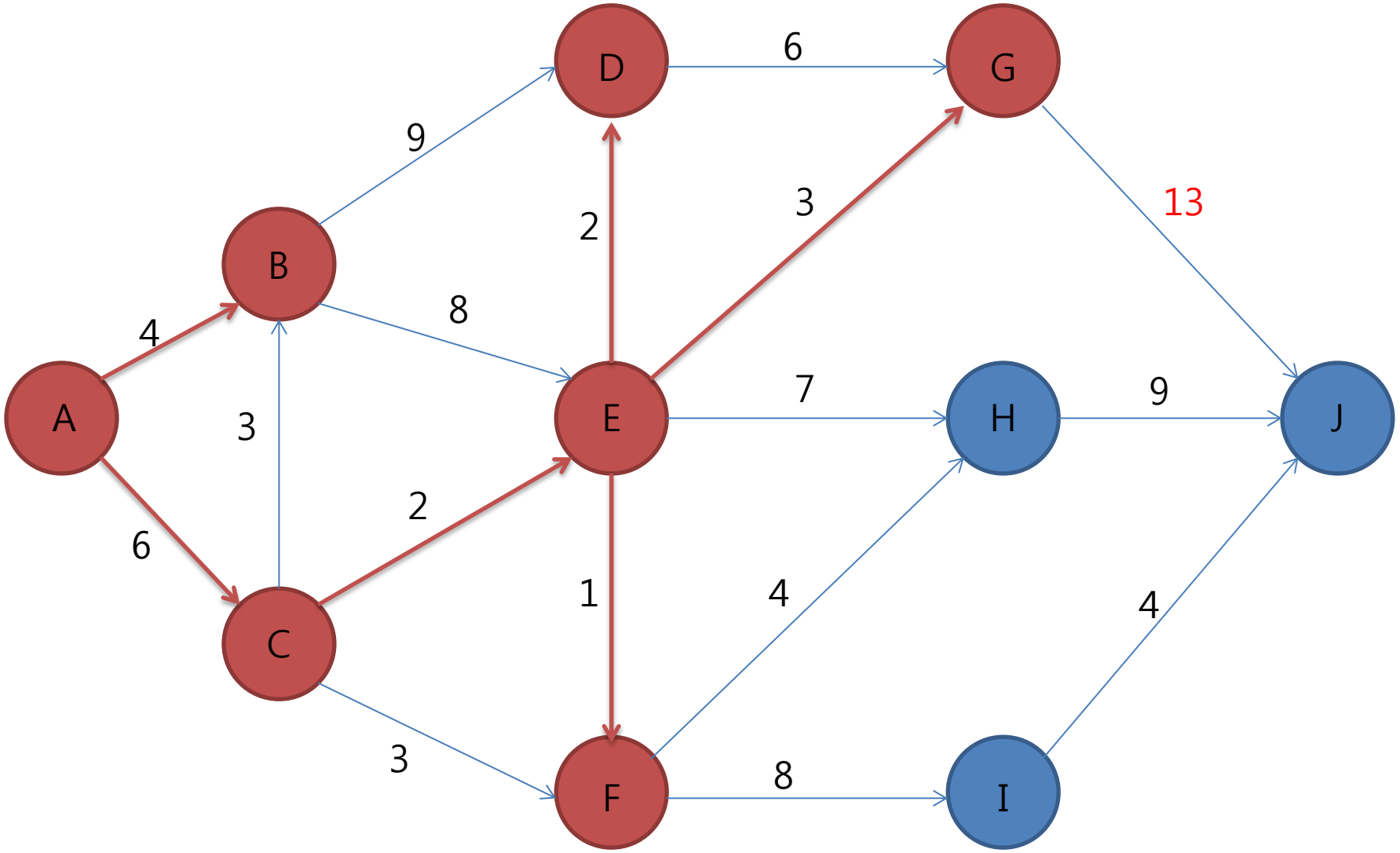
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	X



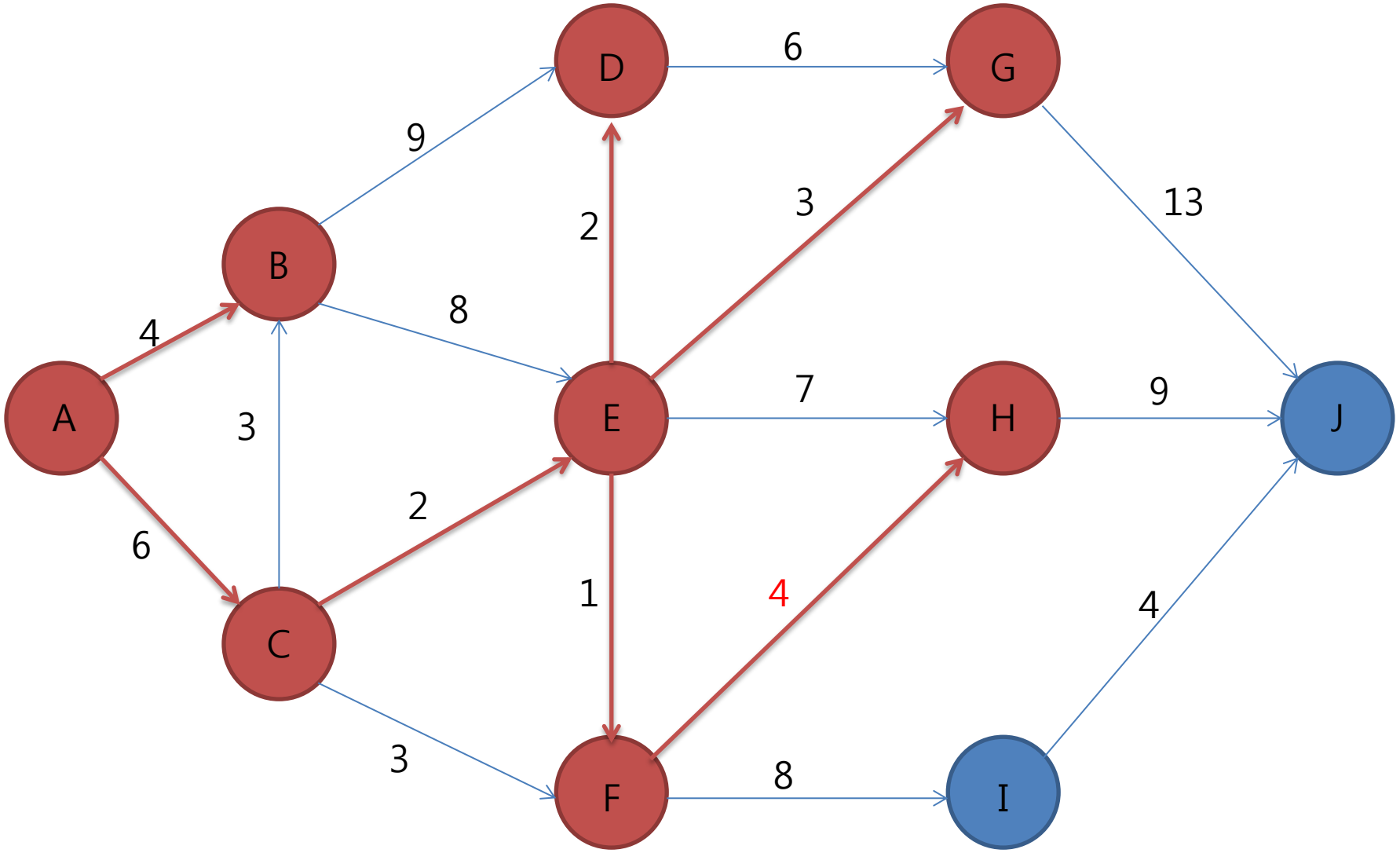
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	X



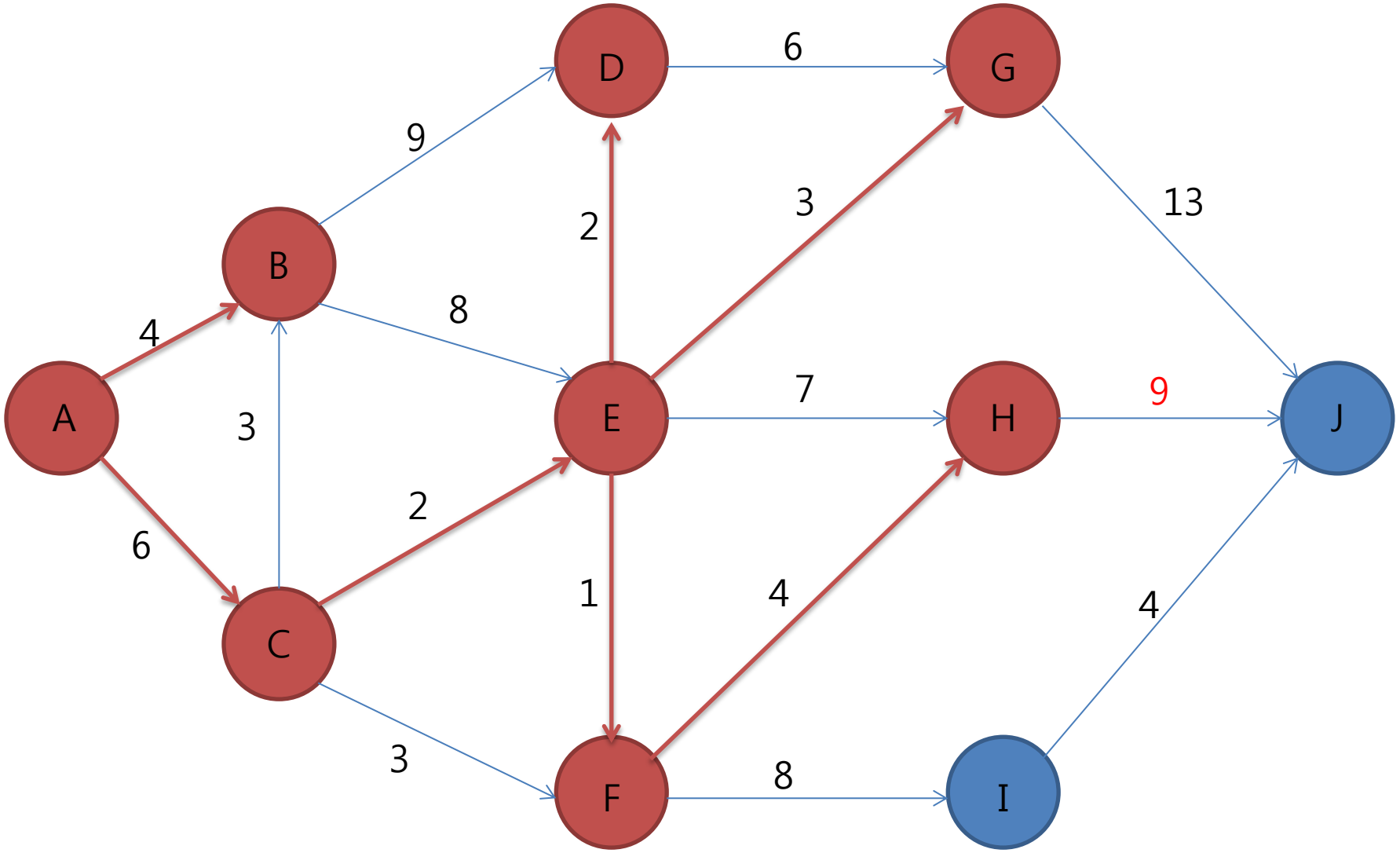
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	X



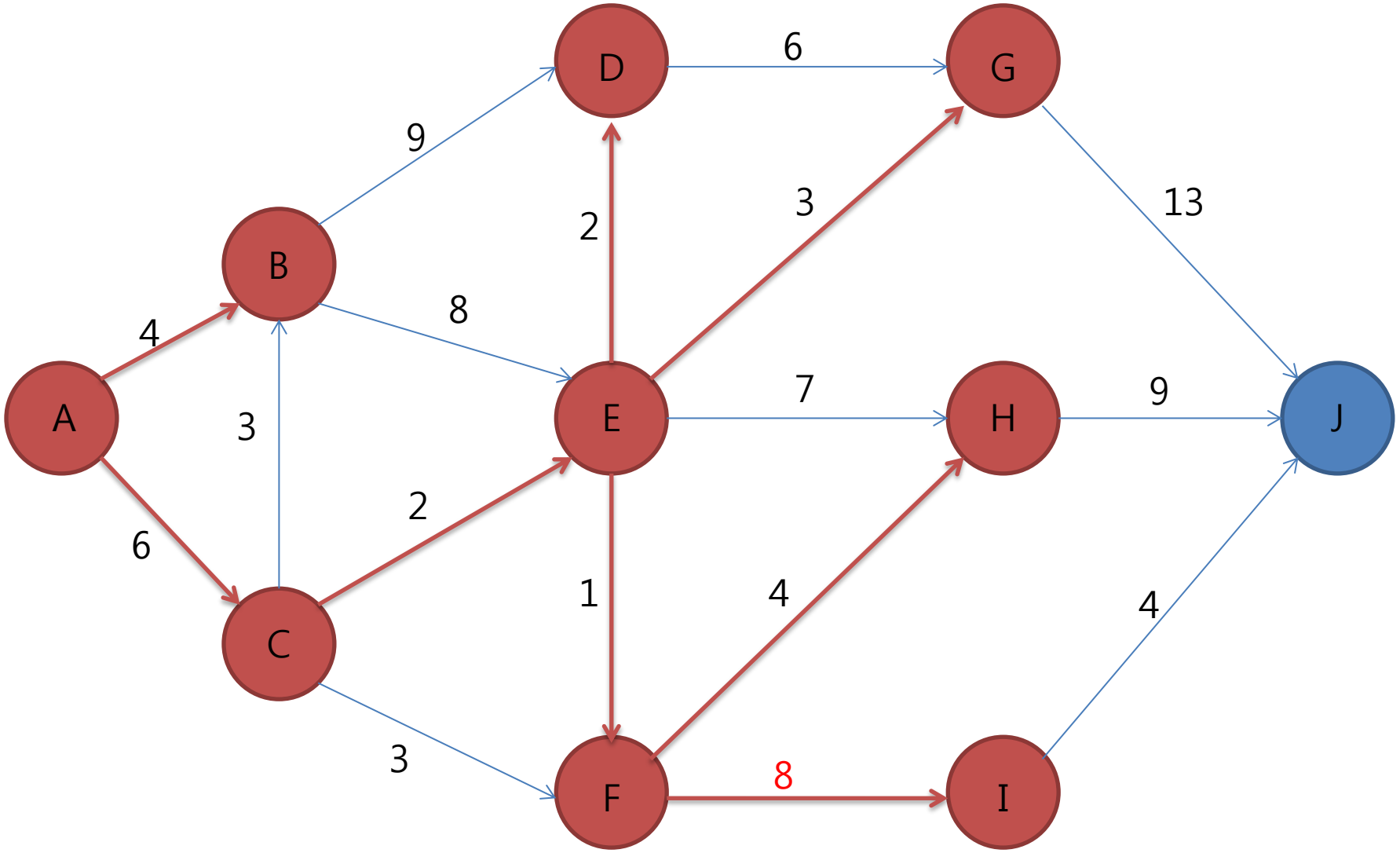
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	24



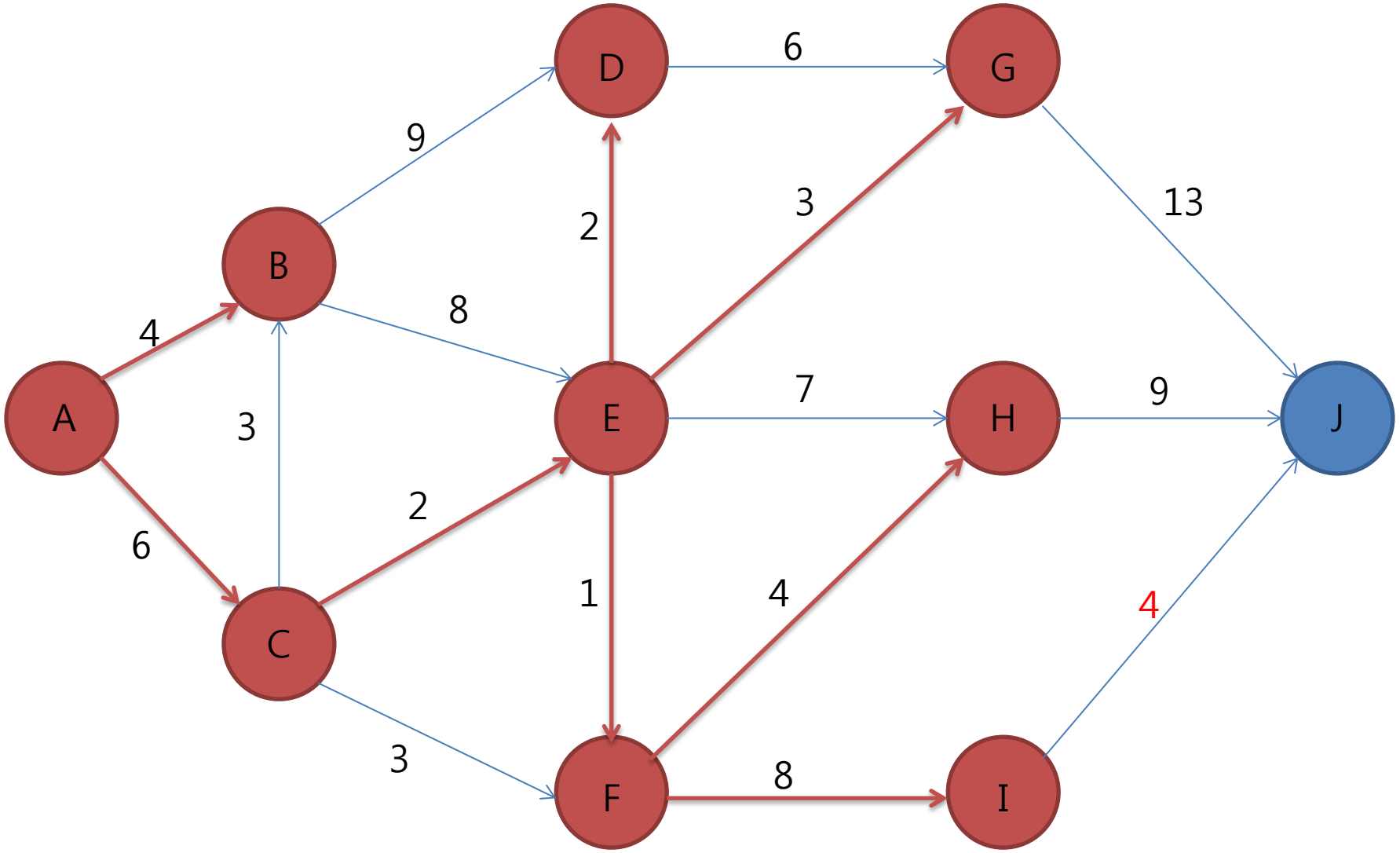
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	24



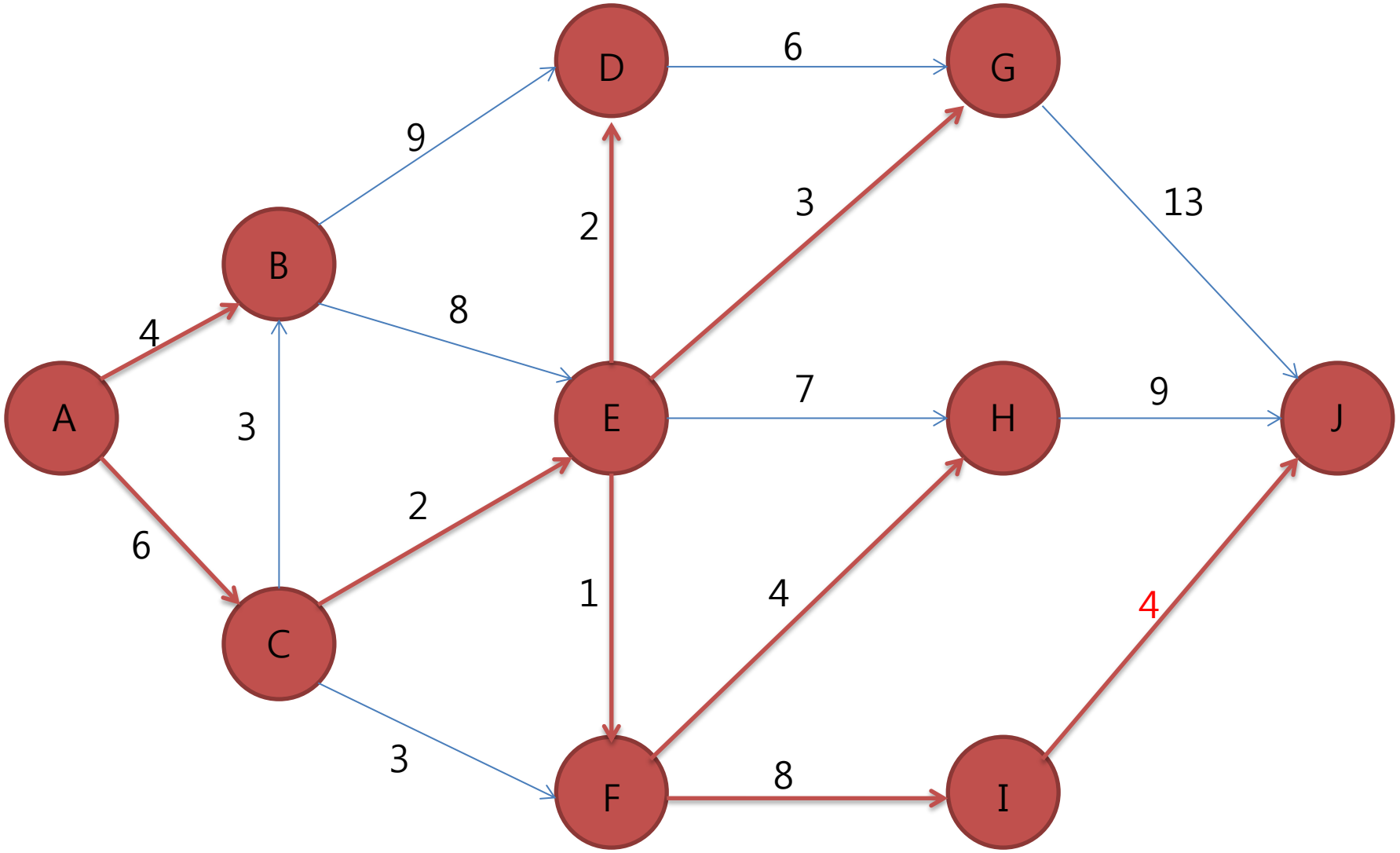
Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	22



Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	22



Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	21



Min	A	B	C	D	E	F	G	H	I	J
	0	4	6	10	8	9	11	13	17	21