Algoritmo de Dijkstra (1/2)

- G: grafo ponderado, simple y conexo, con todos los pesos positivos.
- Vértice inicial = a
- Vértice final = z
- Vértices intermedios = V_1, …. V_n
- Pesos = $w(V_i, V_j)$
- S = conjunto “distinguido” de vértices
- L = distancias mínimas

Algoritmo de Dijkstra (2/2)

procedure Dijkstra (G)

for i := 1 **to** n

    $L(V_i) := \infty$

L(a) := 0

S := Ø

while z NO pertenece a S

begin

    u := vértice con L(u) mínima entre los que no están en S

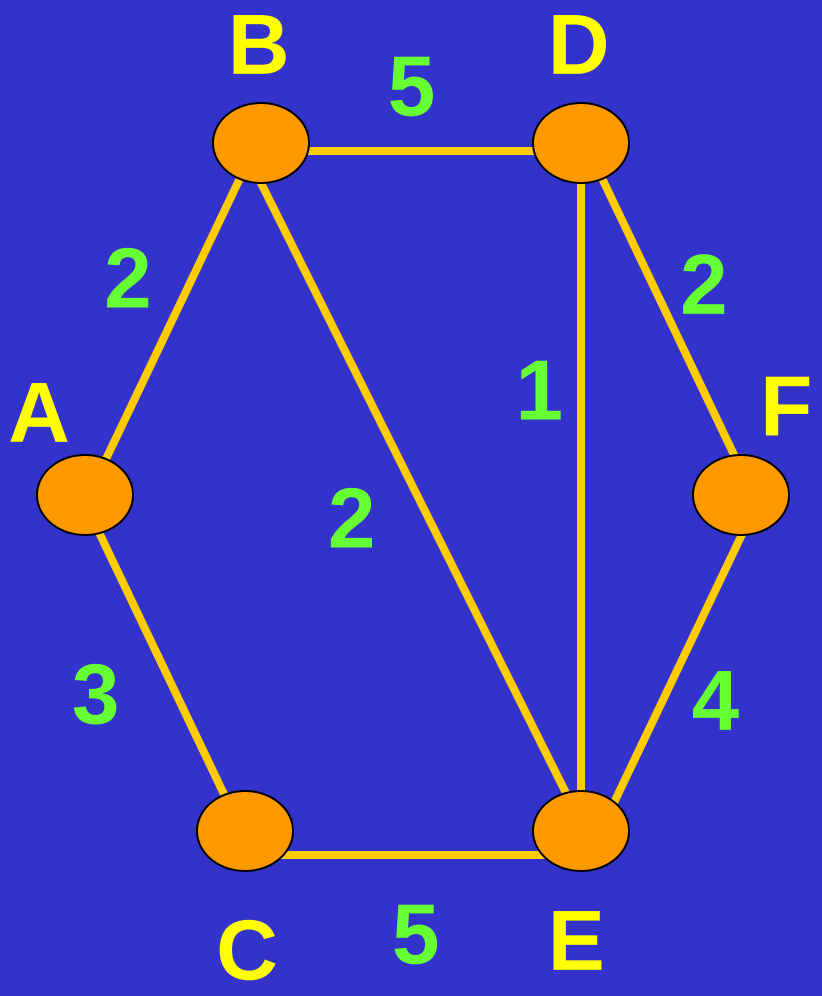
    S := S UNION {u}

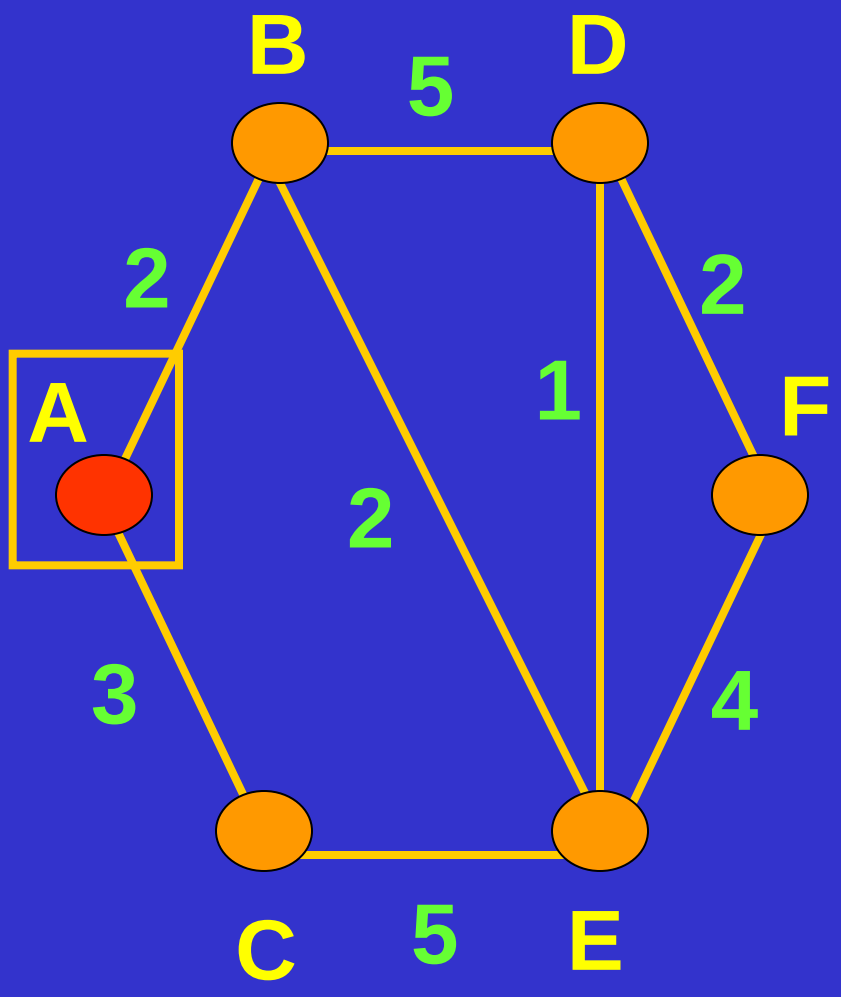
    for todos los vértices v que no están en S

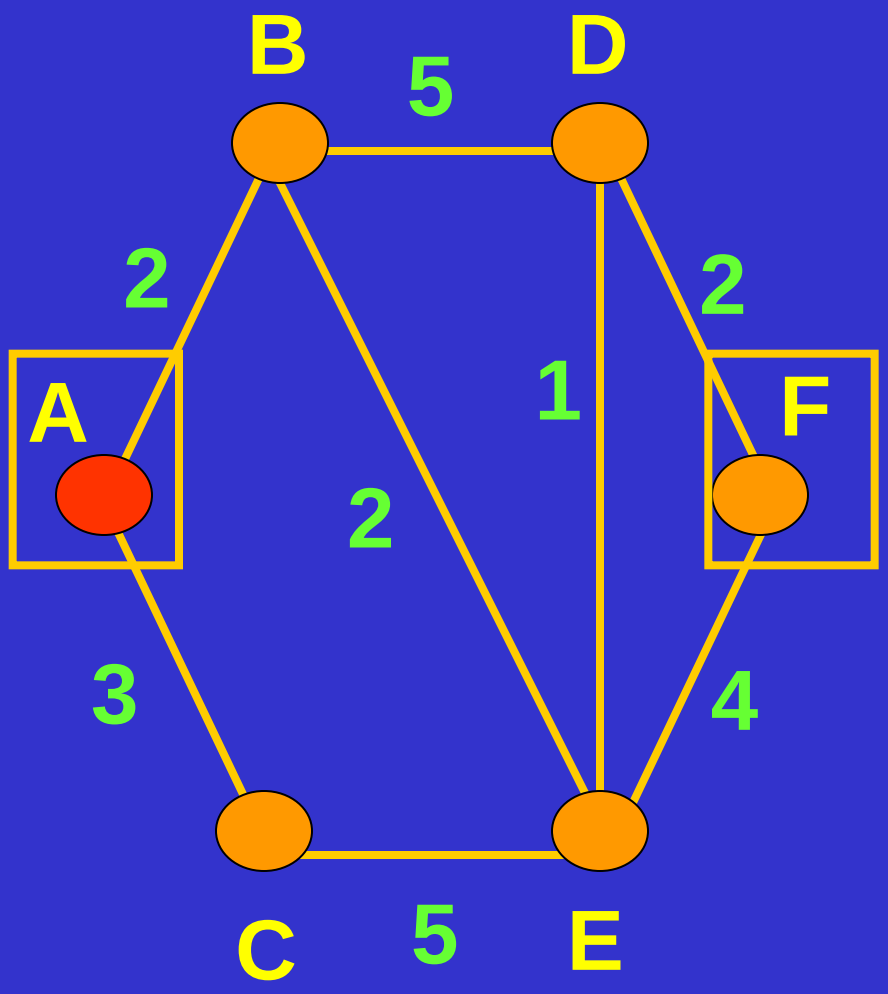
        if L(u) + w(u,v) < L(v) **then** L(v) := L(u) + w(u,v)

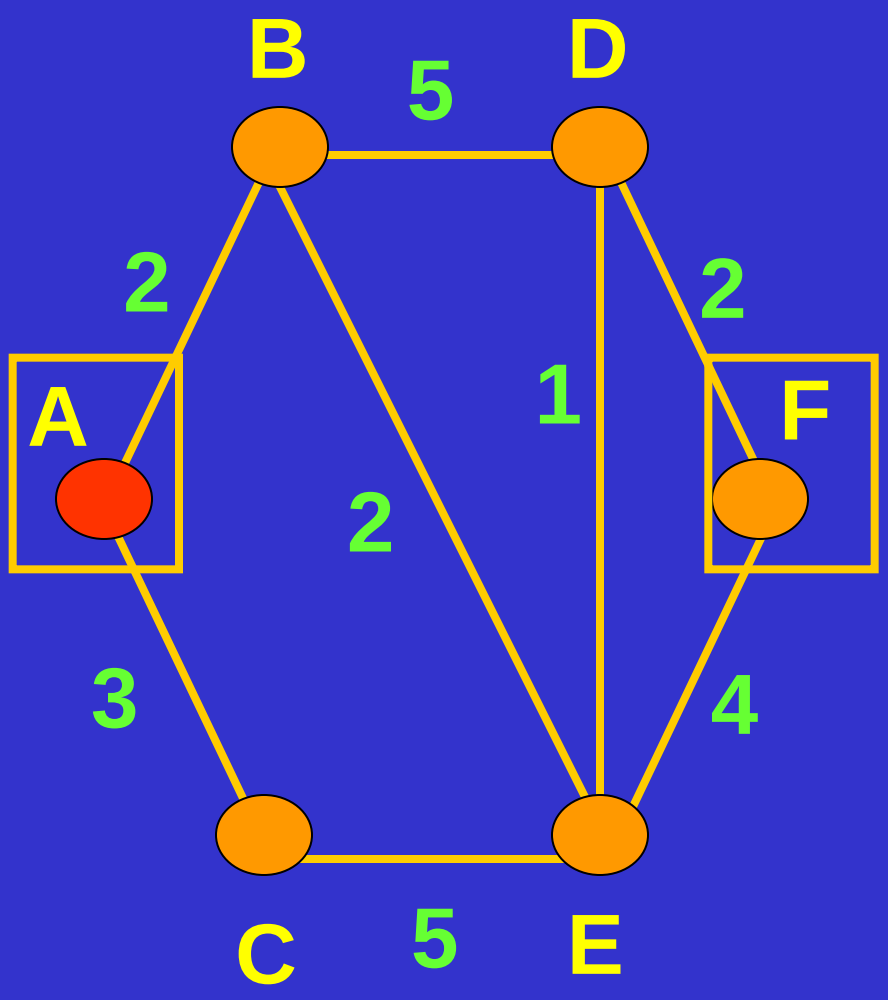
    {esto añade a S un vértice con etiqueta mínima}

end {L(z) = long del camino más corto entre a y z}


B
5
D
2
2
1
A
F
2
3
4
C
5
E


B
5
D
2
2
A
1
F
2
3
4
C
5
E


B
5
D
2
2
1
A
F
2
3
4
C
5
E



V_0

A

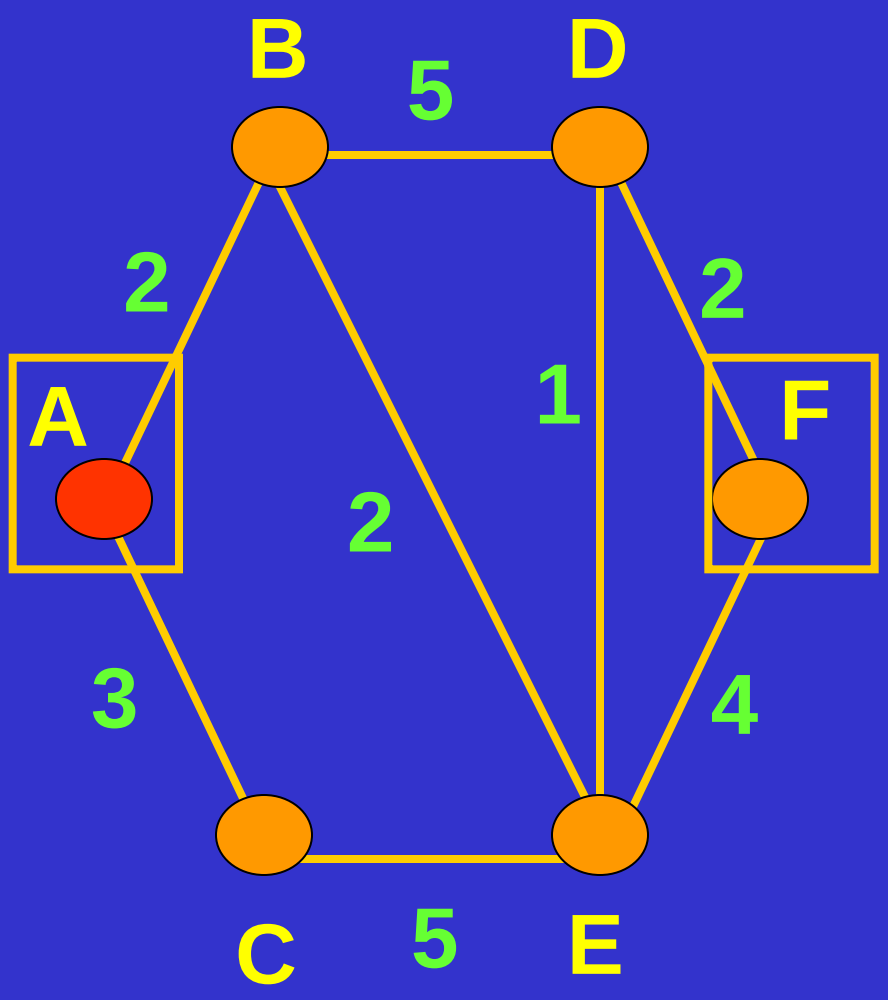
B

C

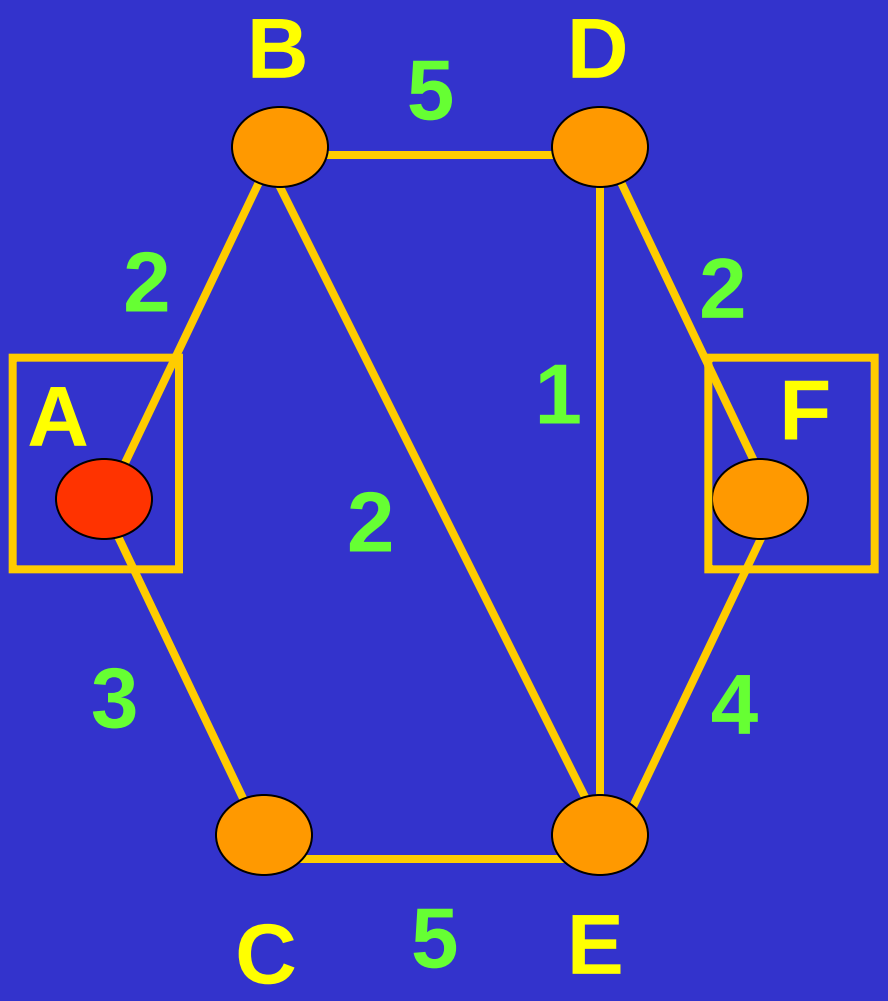
D

E

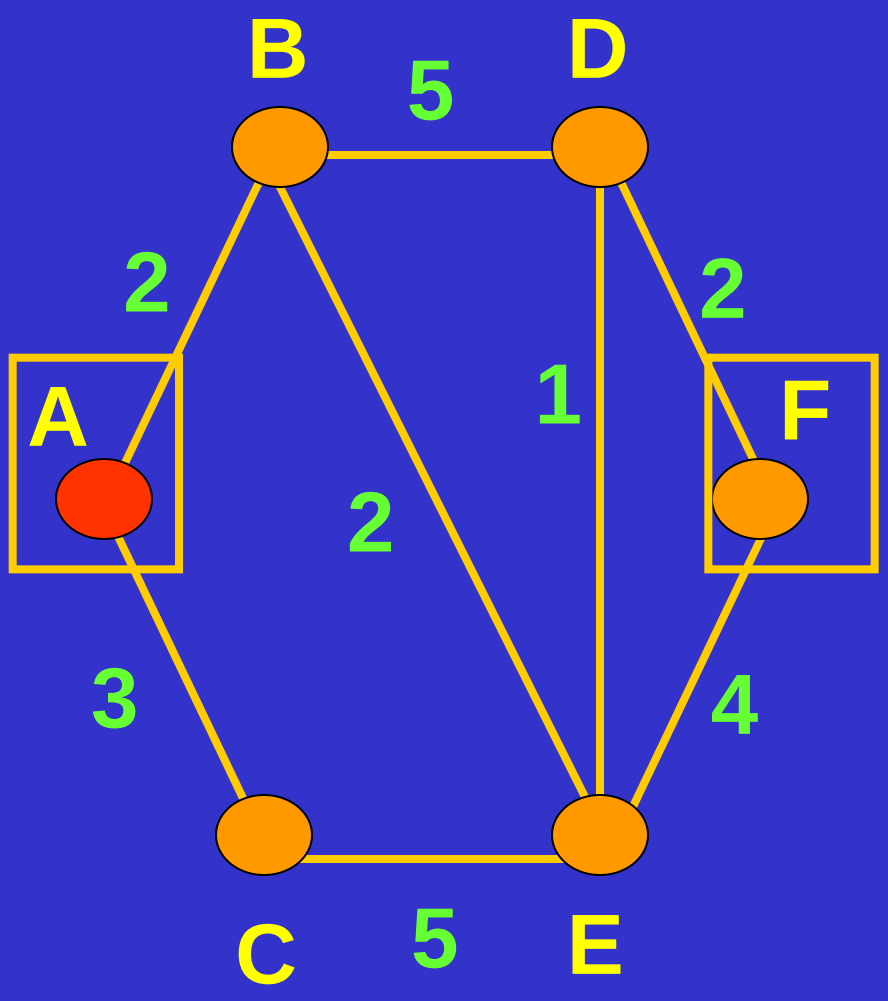
F



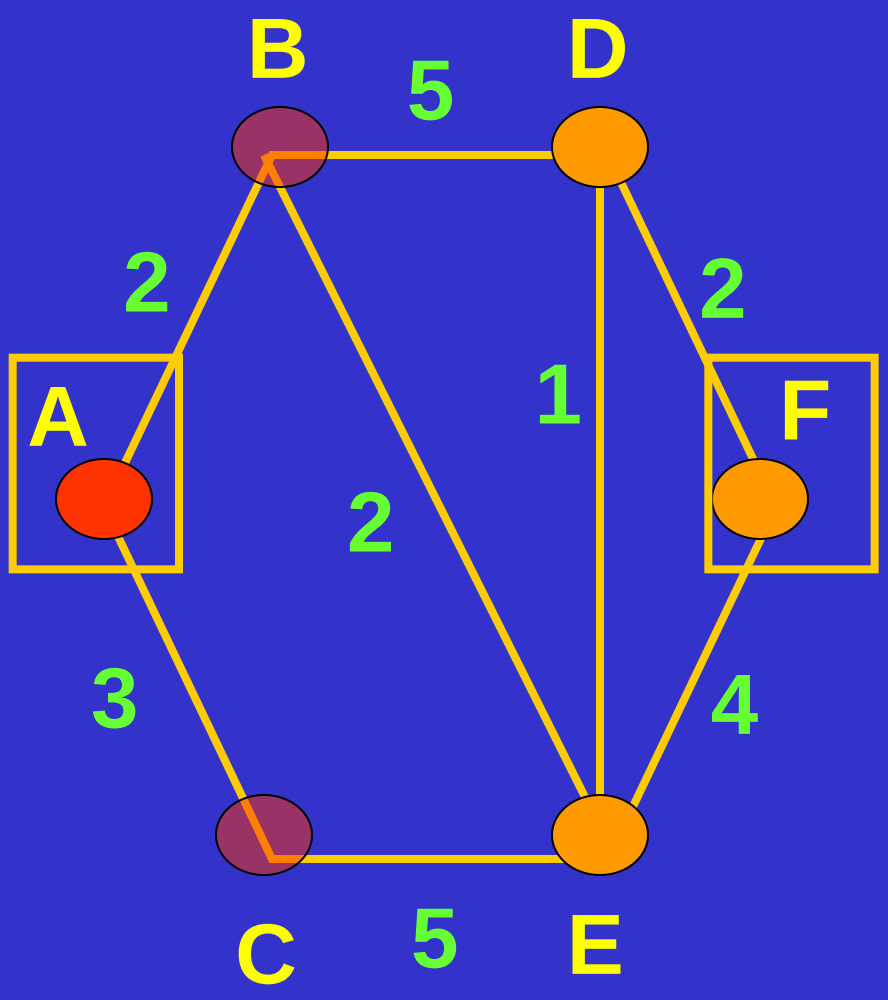
V_0	L_0
A	(0)
B	∞
C	∞
D	∞
E	∞
F	∞



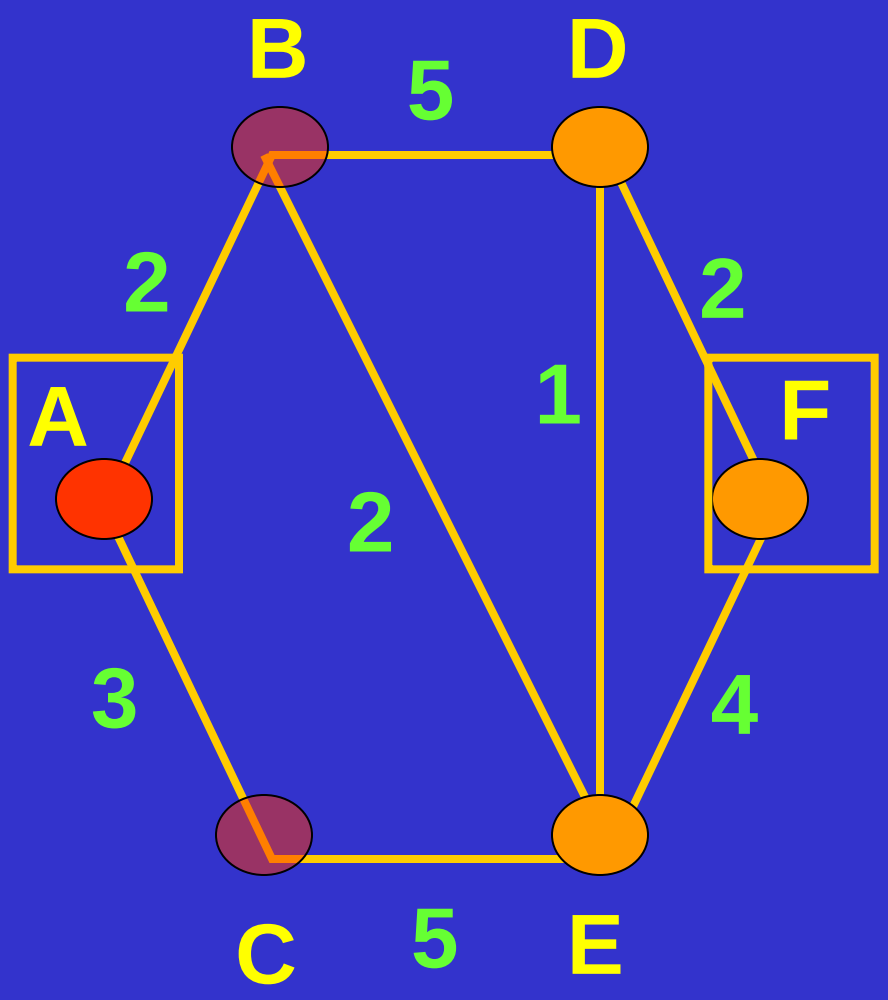
V_1	L_0
A*	(0)
B	∞
C	∞
D	∞
E	∞
F	∞



V_1	L_1	L_0
A*	-	(0)
B		∞
C		∞
D		∞
E		∞
F		∞

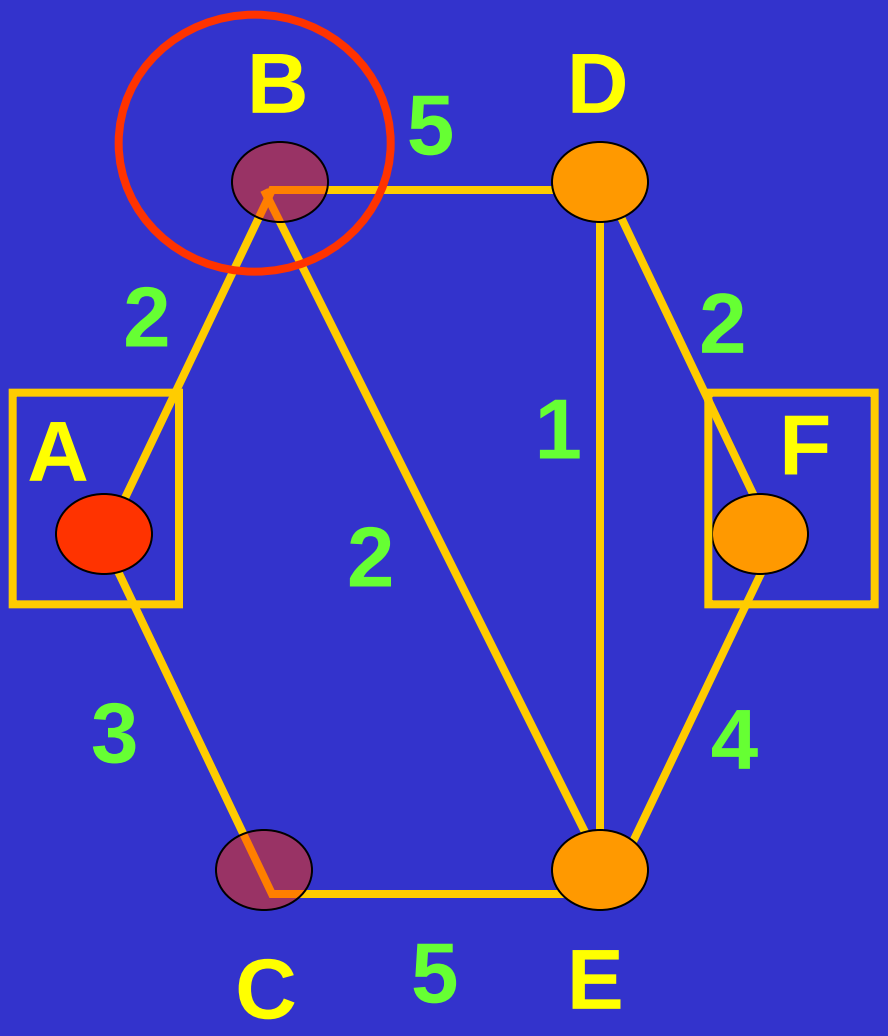


V_1	L_1	L_0
A*	-	(0)
B		∞
C		∞
D		∞
E		∞
F		∞



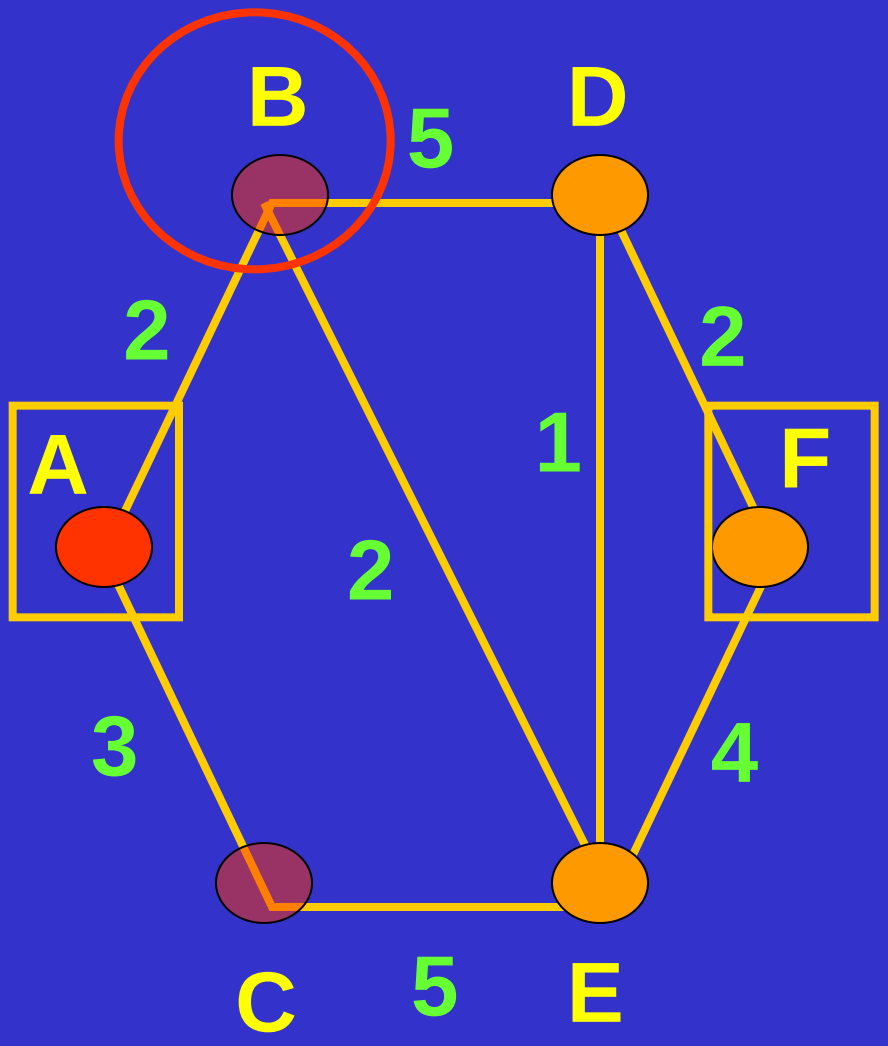
V_1	L_1	L_0
A*	-	(0)
B		∞
C		∞
D		∞
E		∞
F		∞

$$L(v_j) = L(v_{i-1}^*) + w(v_{i-1}, v_j)$$



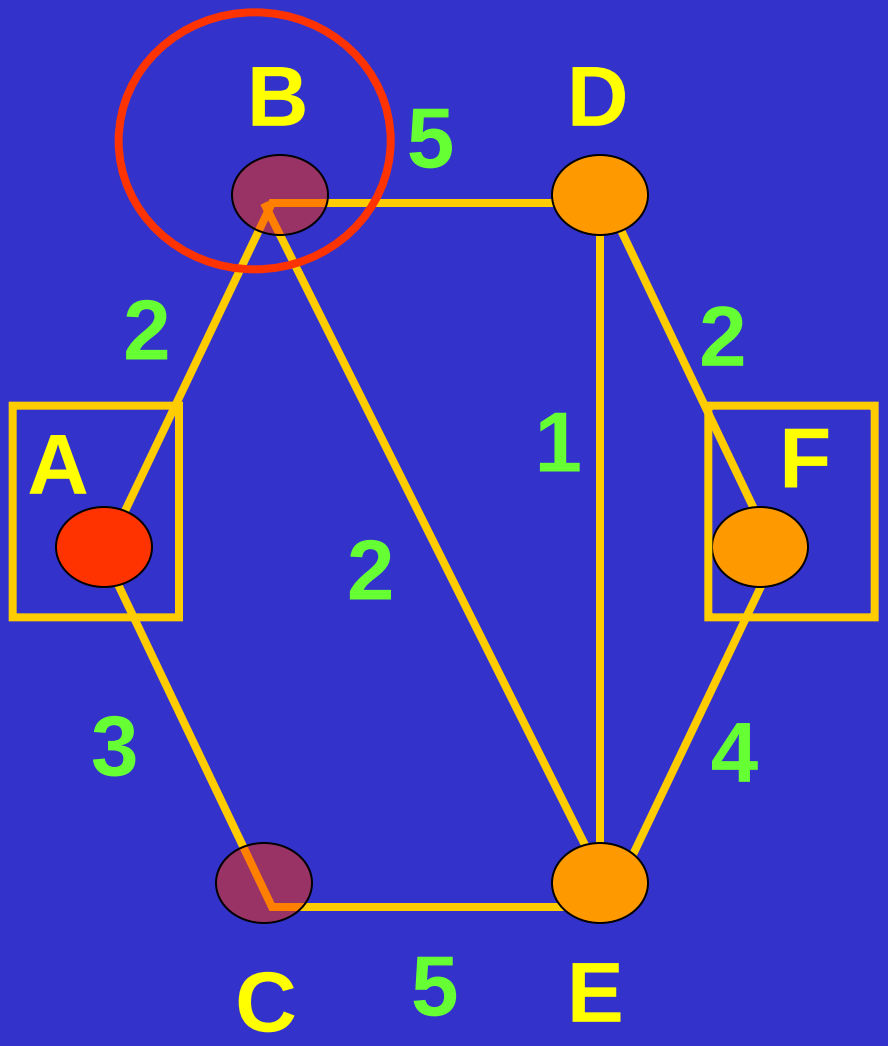
V_1	L_1	L_0
A*	-	(0)
B		∞
C		∞
D		∞
E		∞
F		∞

$$L(v_j) = L(v_{i-1}^*) + w(v_{i-1}, v_j)$$



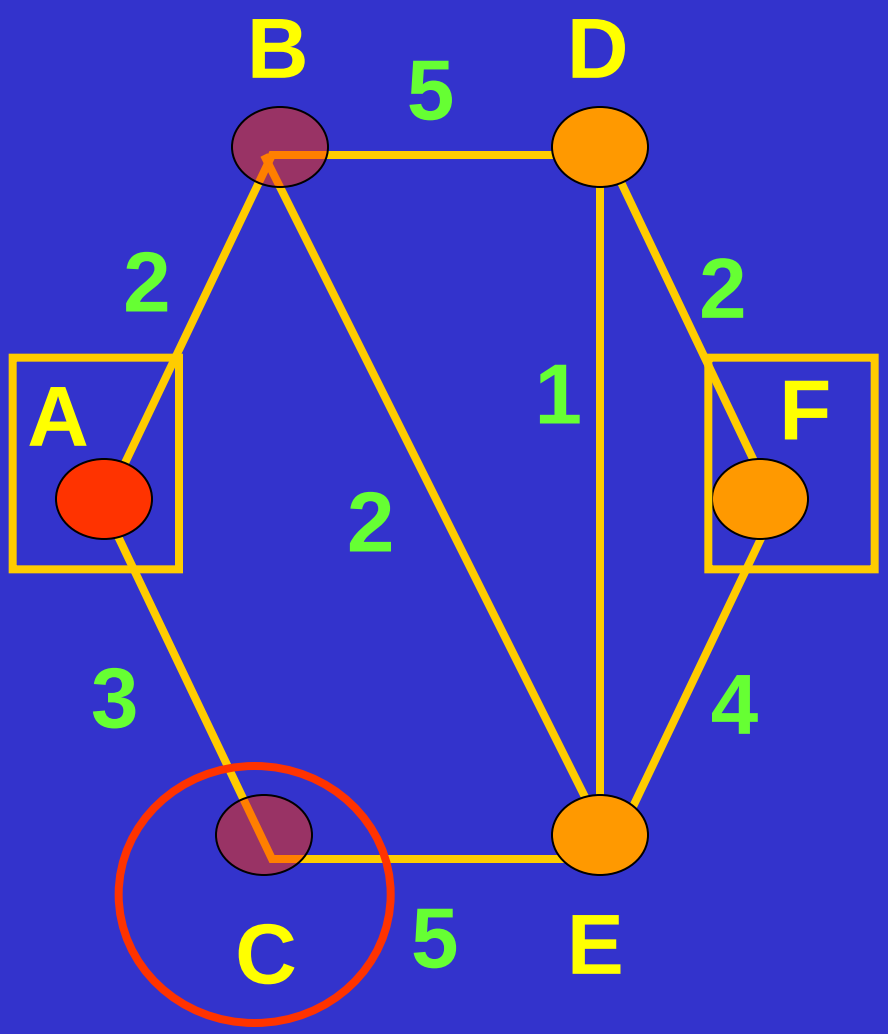
V_1	L_1	L_0
A*	-	(0)
B		∞
C		∞
D		∞
E		∞
F		∞

$L(B_A) = L(A^*) + w(A^*, B) = 0+2 = 2$



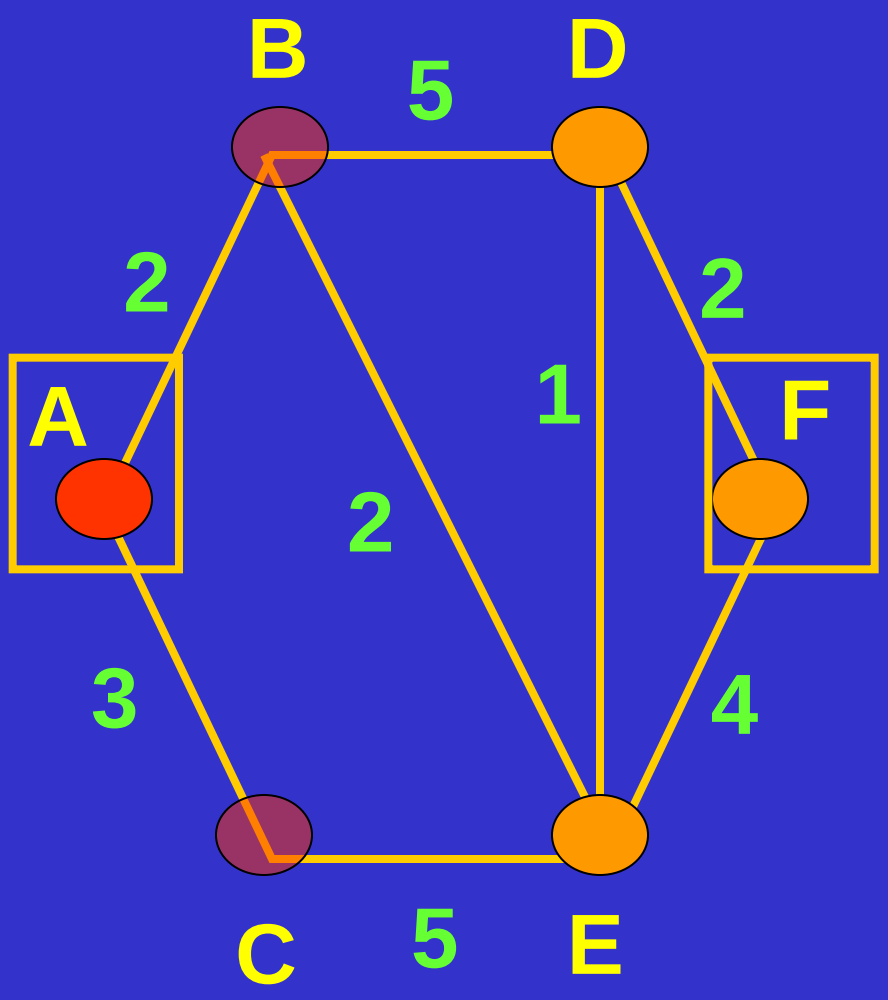
V_1	L_1	L_0
A*	-	(0)
B_A	2	∞
C		∞
D		∞
E		∞
F		∞

$$L(B_A) = L(A^*) + w(A^*, B)$$

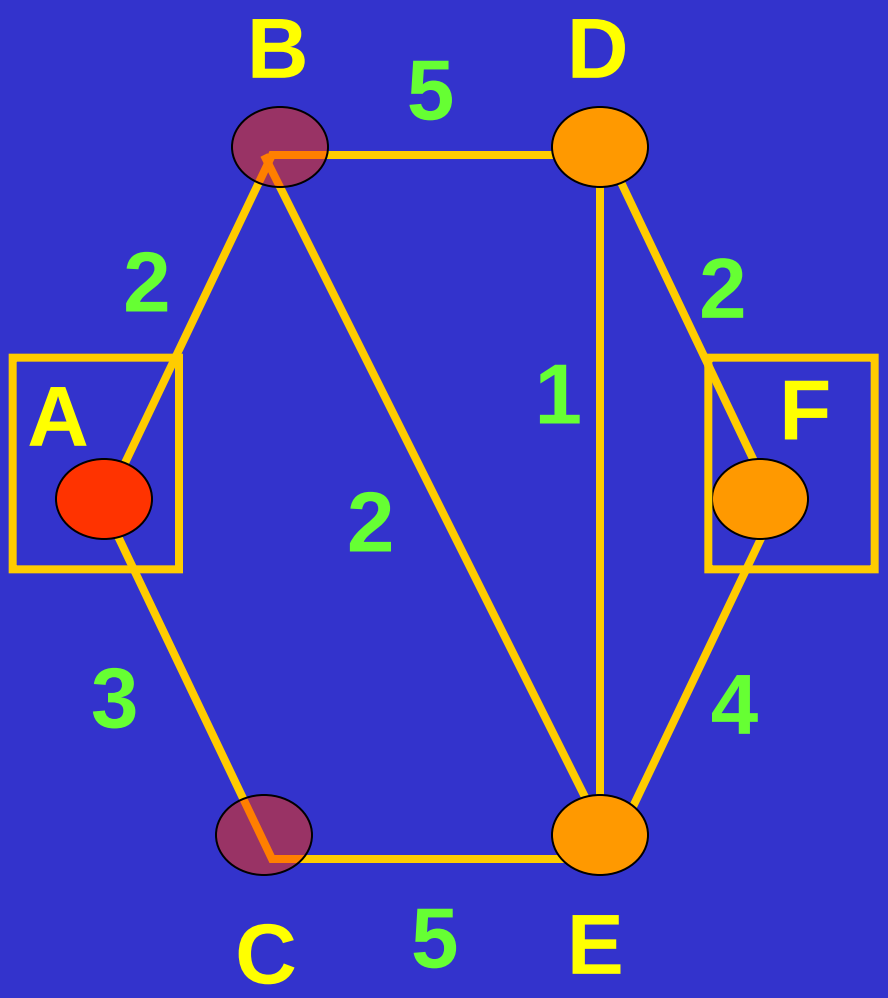


V_1	L_1	L_0
A*	-	(0)
B_A	2	∞
C_A	3	∞
D		∞
E		∞
F		∞

$L(C_A) = L(A^*) + w(A^*, C) = 0+3 = 3$

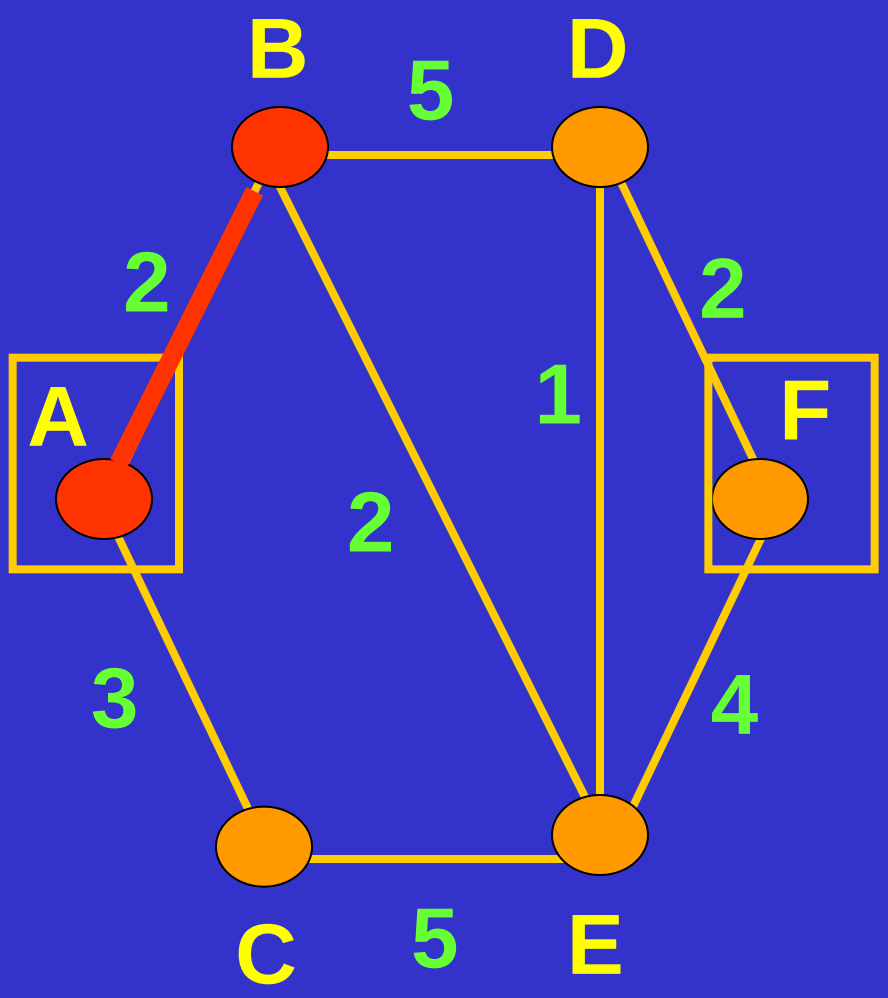


V_1	L_1	L_0
A*	-	(0)
B_A	2	∞
C_A	3	∞
D	∞	∞
E	∞	∞
F	∞	∞



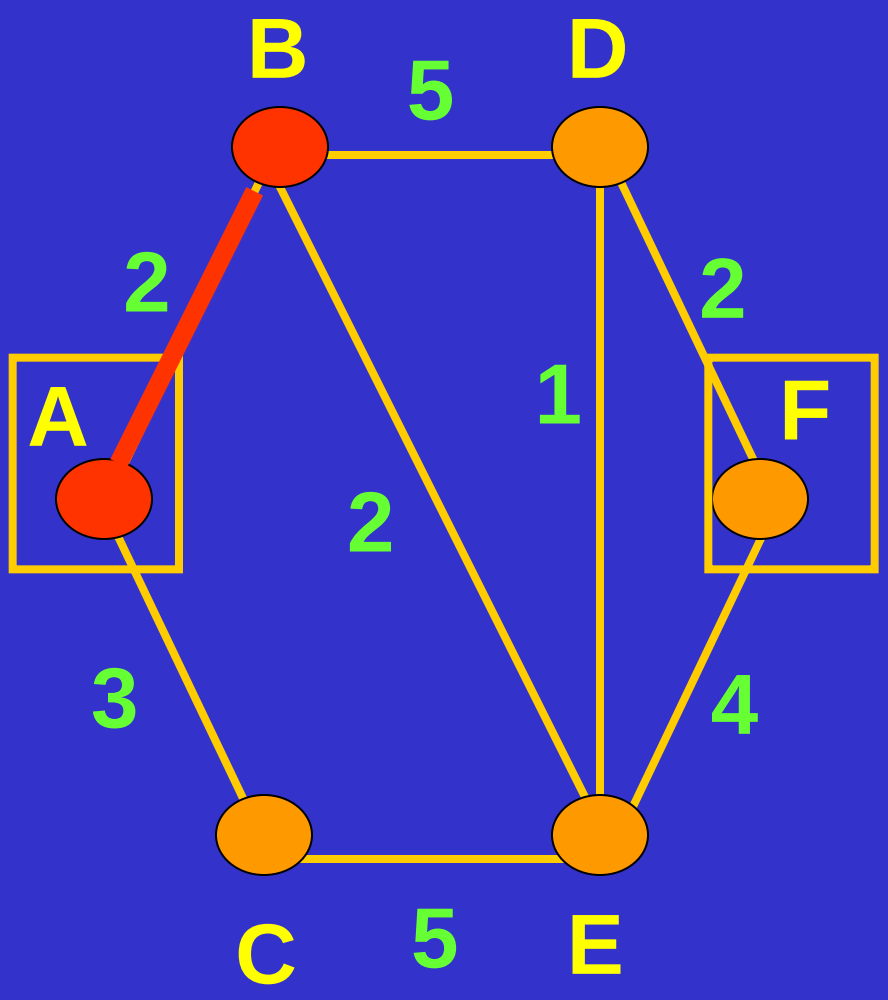
V_1	L_1	L_0
A*	-	(0)
B_A	2	∞
C_A	3	∞
D	∞	∞
E	∞	∞
F	∞	∞

L(B) < L(C)

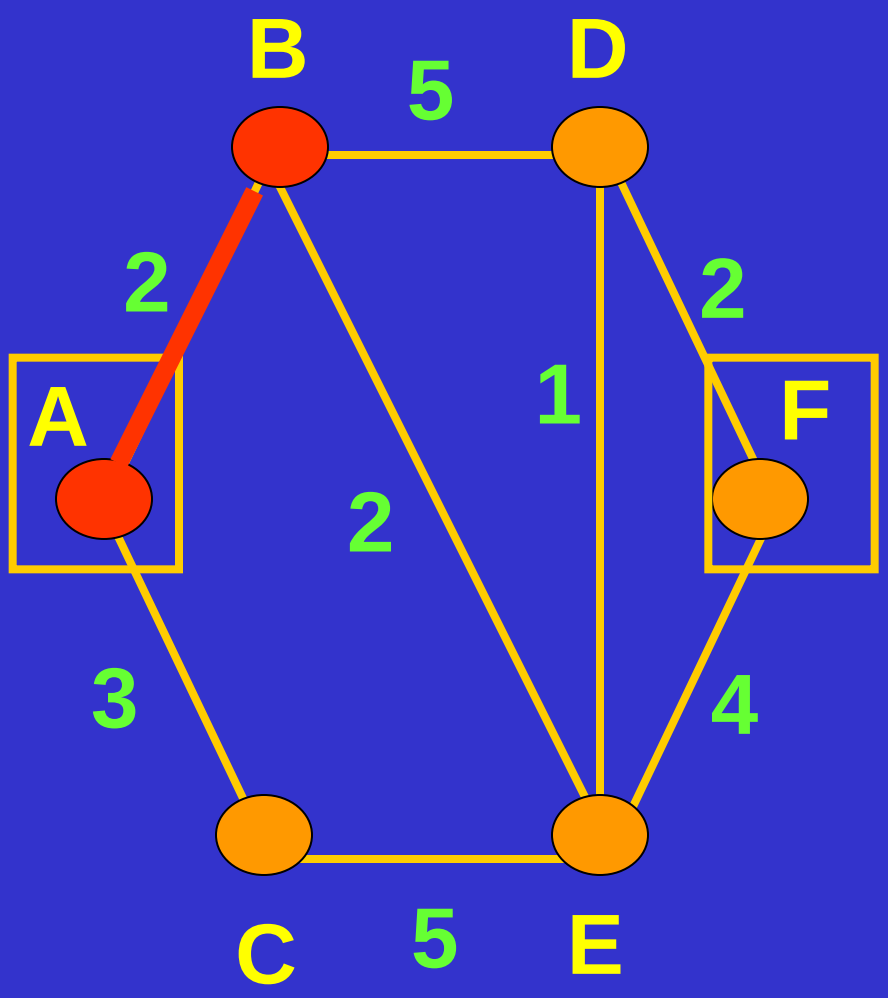


V_1	L_1	L_0
A*	-	(0)
B_A	2	∞
C_A	3	∞
D	∞	∞
E	∞	∞
F	∞	∞

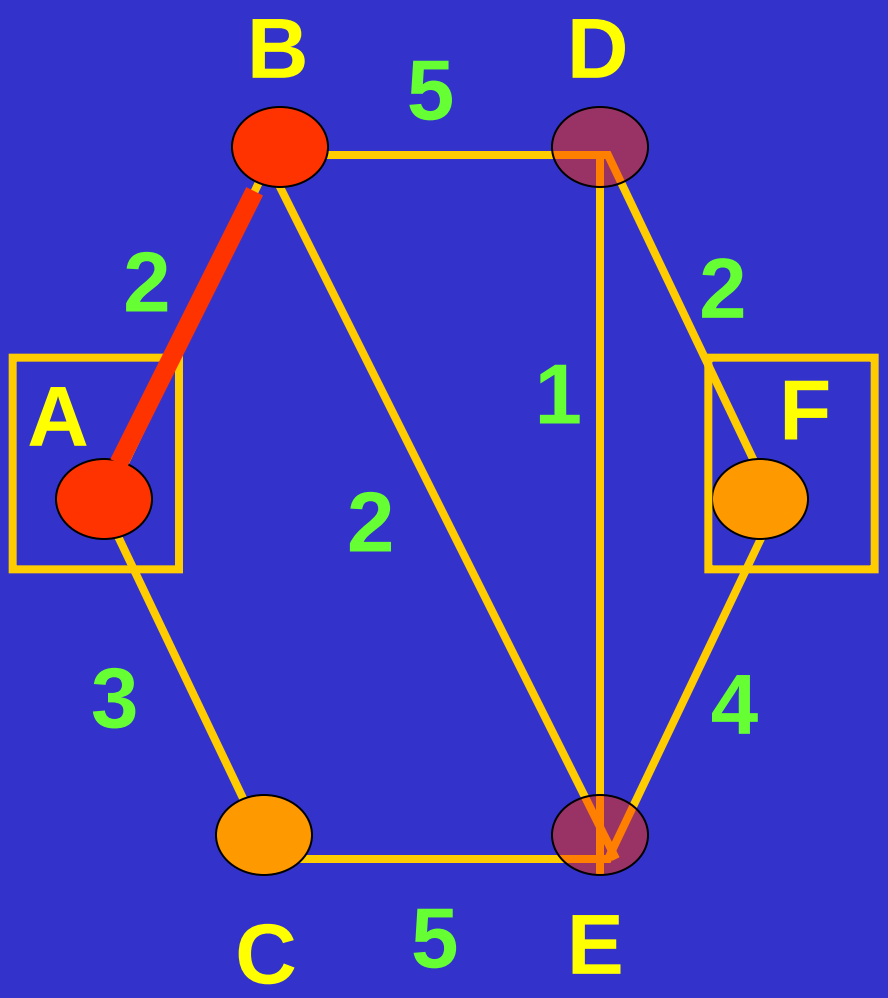
L(B) < L(C)



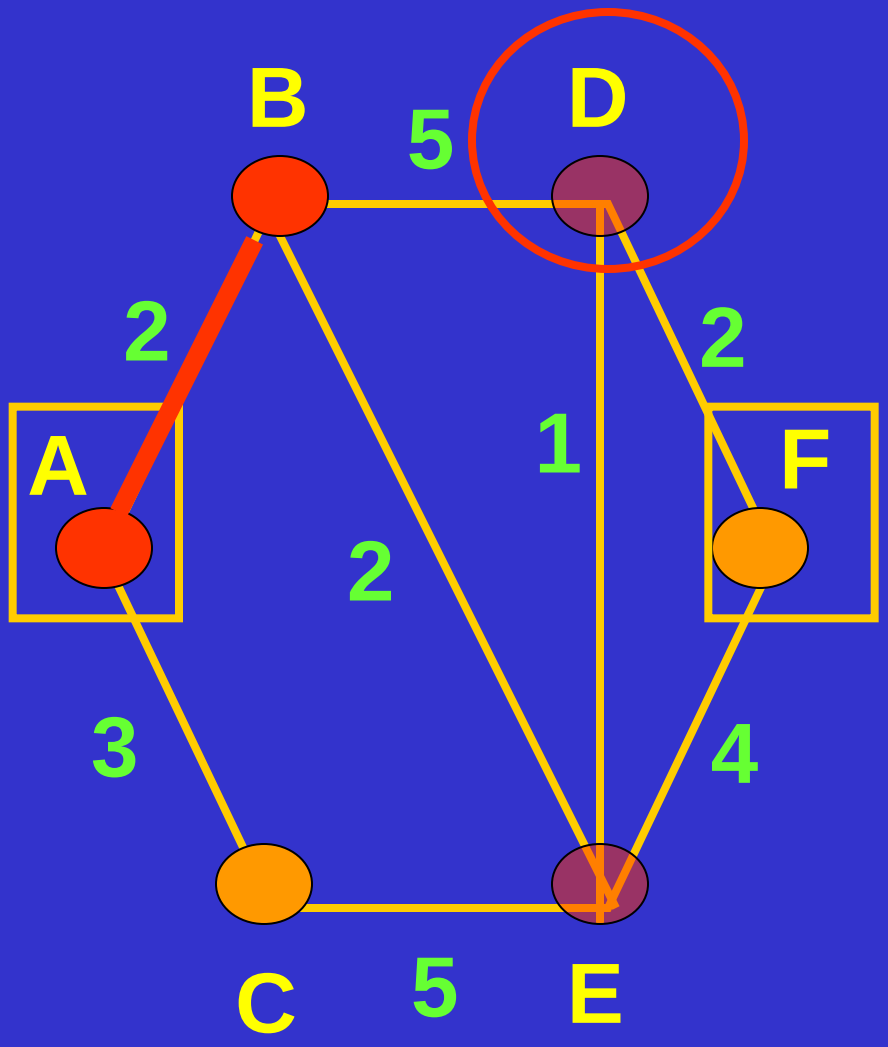
V_2	L_1
A*	-
B_A*	(2)
C_A	3
D	∞
E	∞
F	∞



V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D		∞
E		∞
F		∞

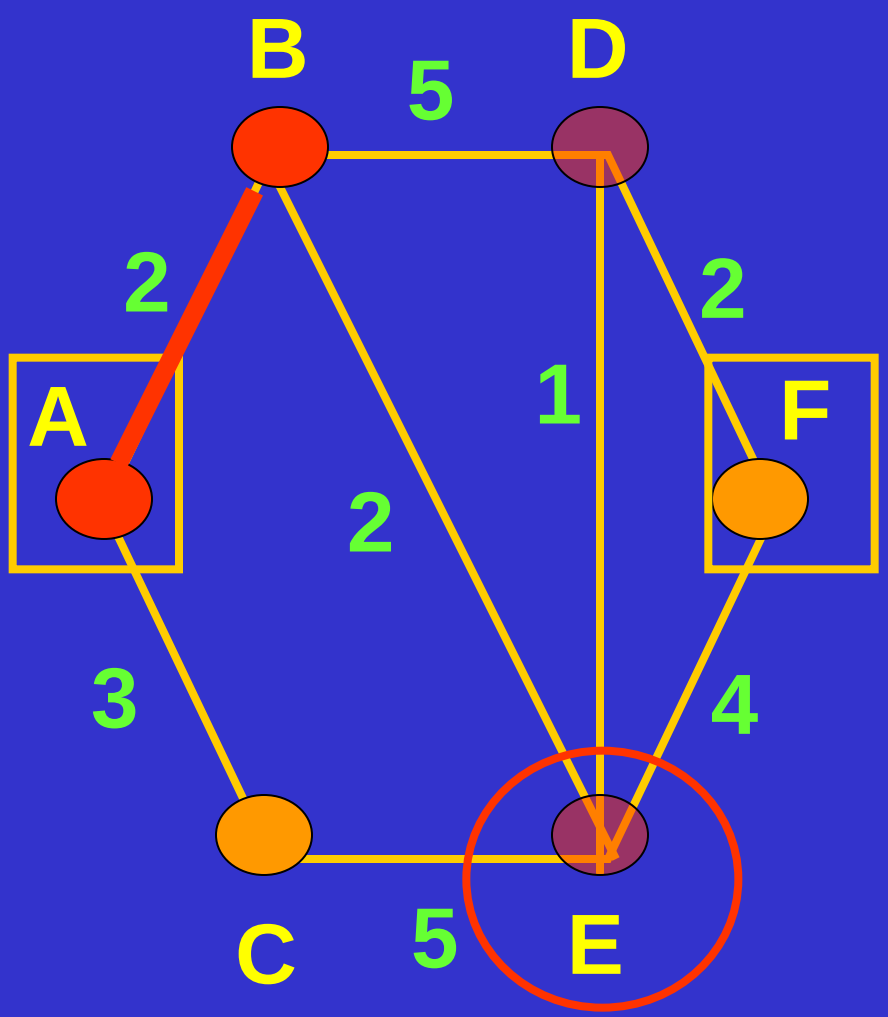


V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D		∞
E		∞
F		∞



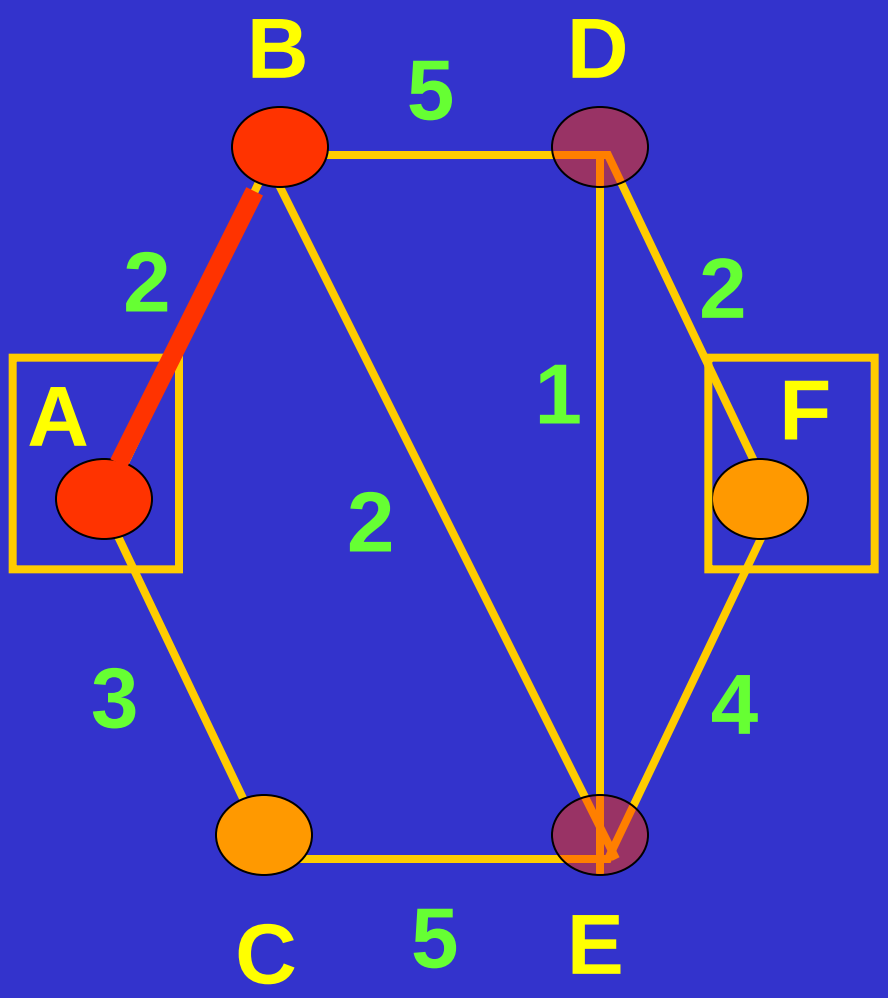
V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D_B	7	∞
E		∞
F		∞

$L(D_B) = L(B_A^*) + w(B_A^*, D) = 2+5 = 7$

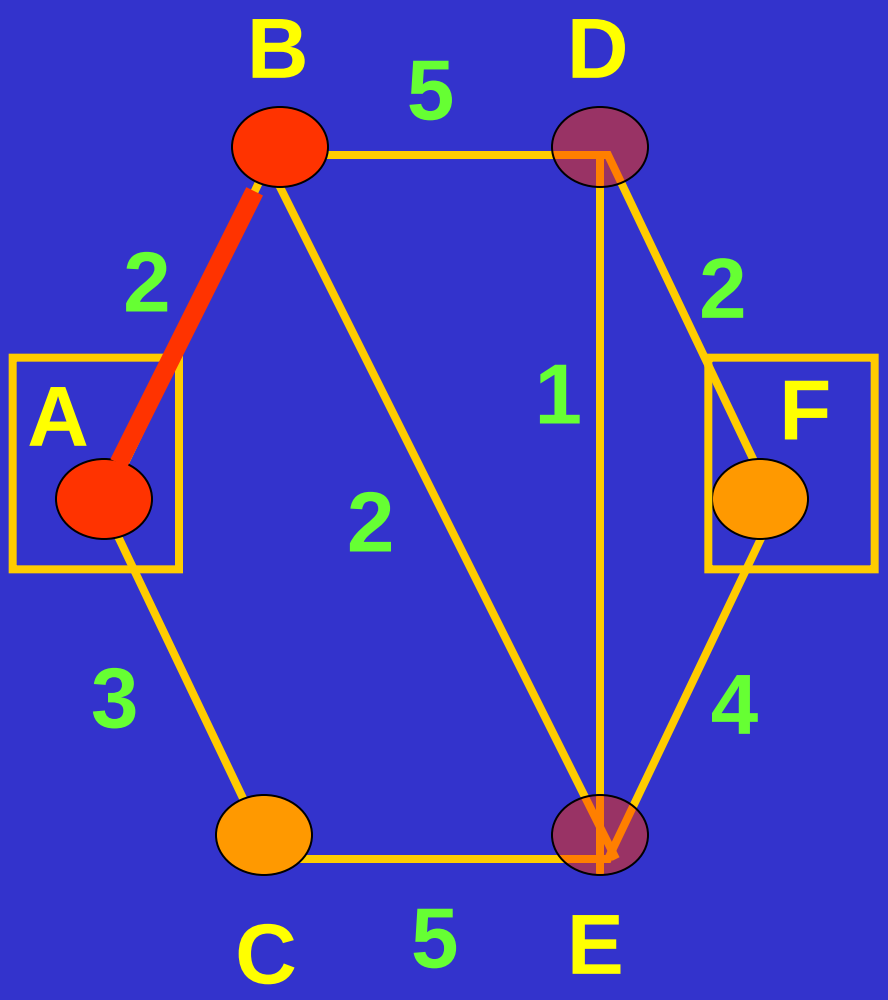


V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D_B	7	∞
E		∞
F		∞

$L(E_B) = L(B_A^*) + w(B_A^*, E) = 2+2 = 4$

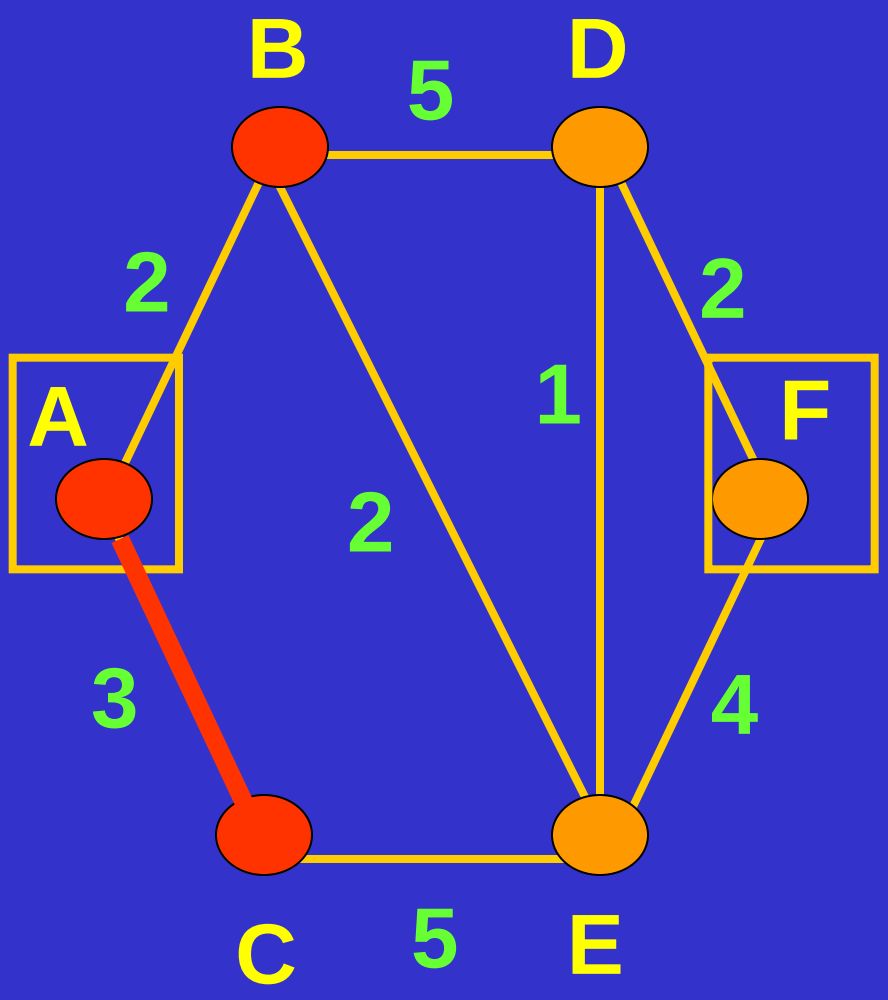


V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D_B	7	∞
E_B	4	∞
F	∞	∞

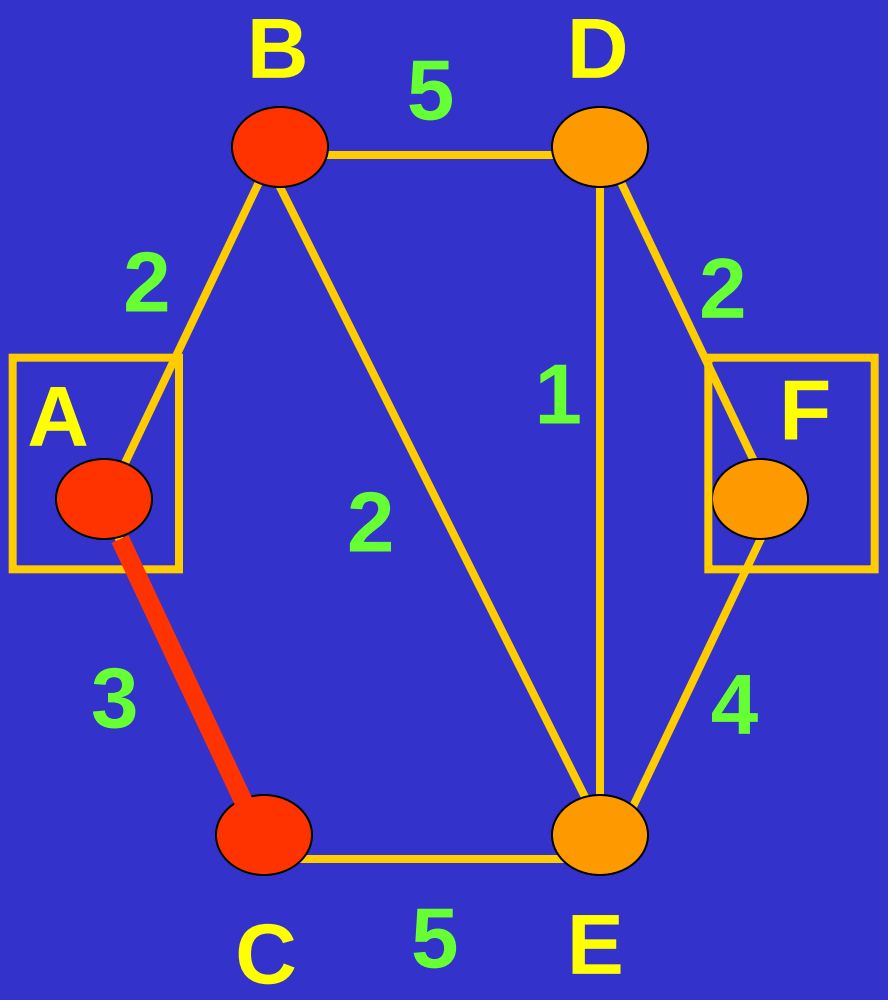


V_2	L_2	L_1
A*	-	-
B_A*	-	(2)
C_A	3	3
D_B	7	∞
E_B	4	∞
F	∞	∞

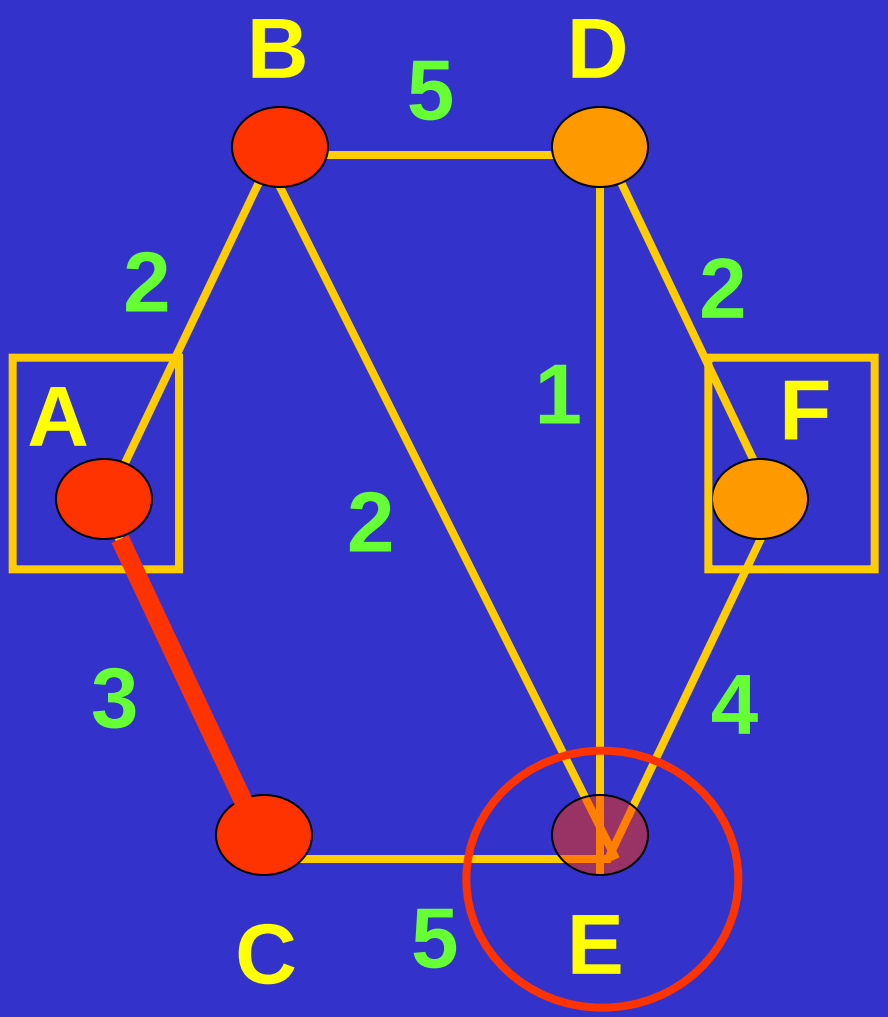
L(C) < L(E) < L(D)



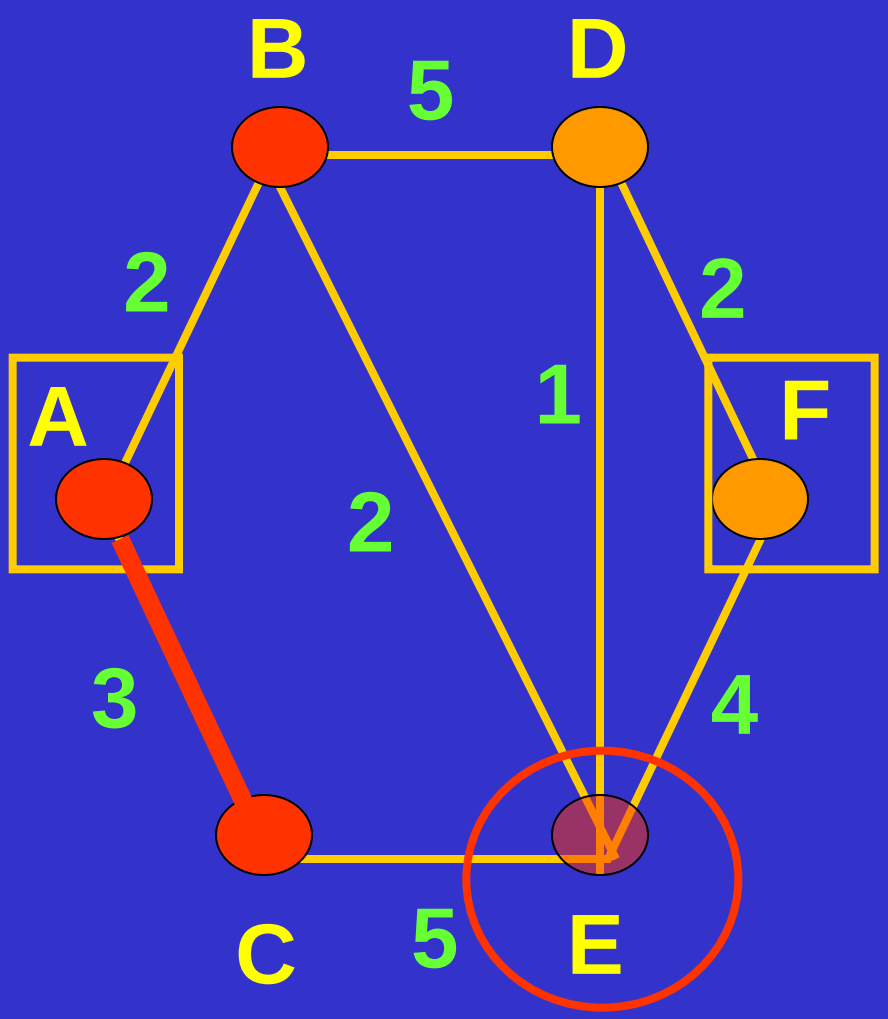
V_3	L_2
A*	-
B_A*	-
C_A*	(3)
D_B	7
E_B	4
F	∞



V_3	L_3	L_2
A*	-	-
B_A*	-	-
C_A*	-	(3)
D_B	7	7
E_B	4	4
F		∞

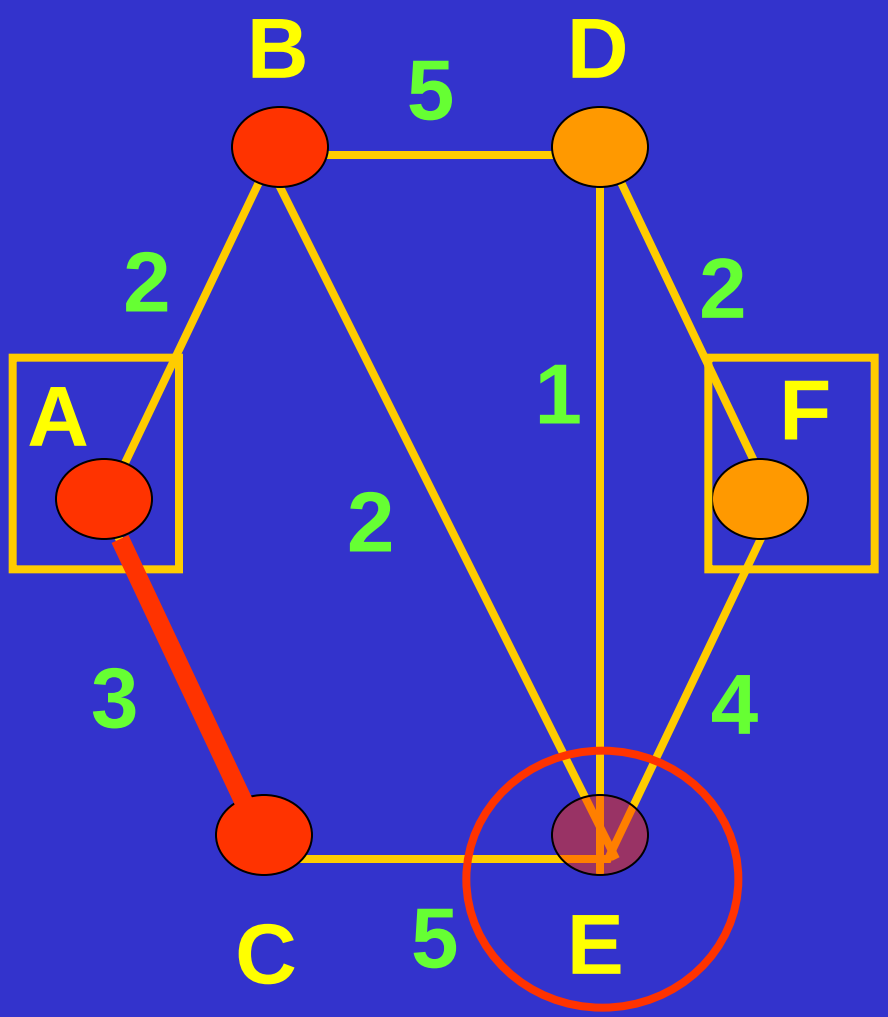


V_4	L_3	L_2
A*	-	-
B_A*	-	-
C_A*	-	(3)
D_B	7	7
E_B	4	4
F		∞



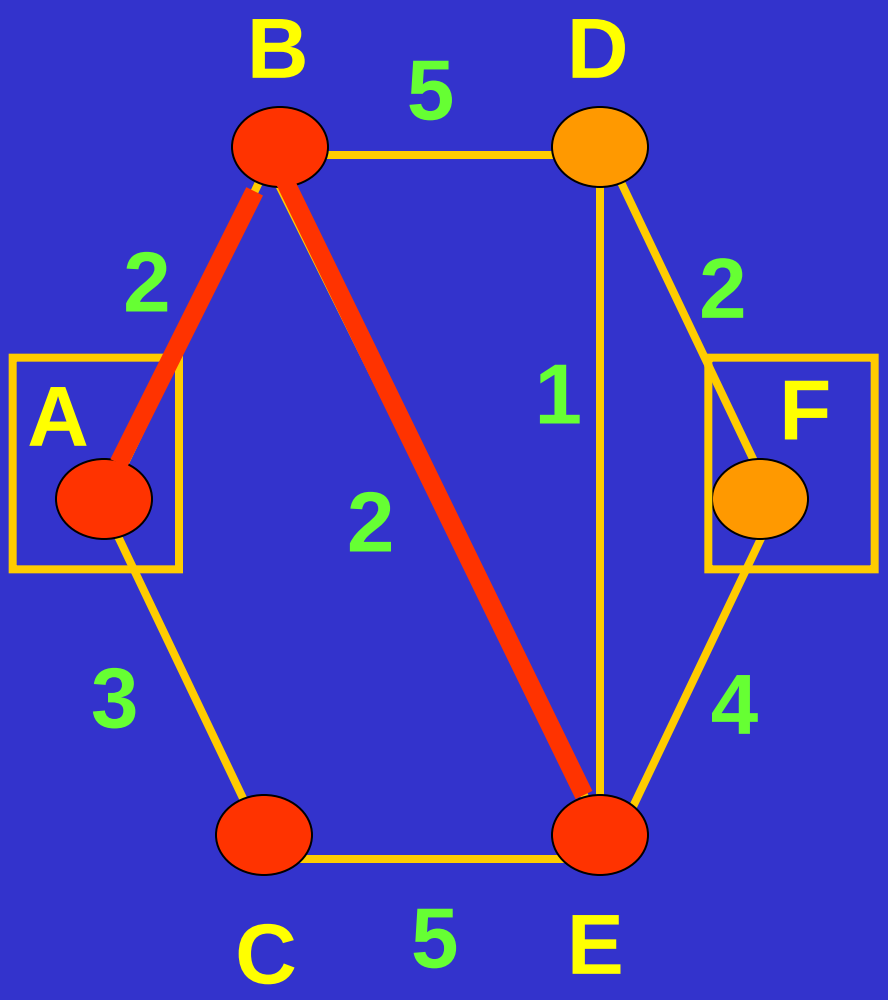
V_4	L_3	L_2
A*	-	-
B_A*	-	-
C_A*	-	(3)
D_B	7	7
E_B	4	4
F		∞

$L(E_C) = L(C_A^*) + w(C_A^*, E) = 3+5 = 8$

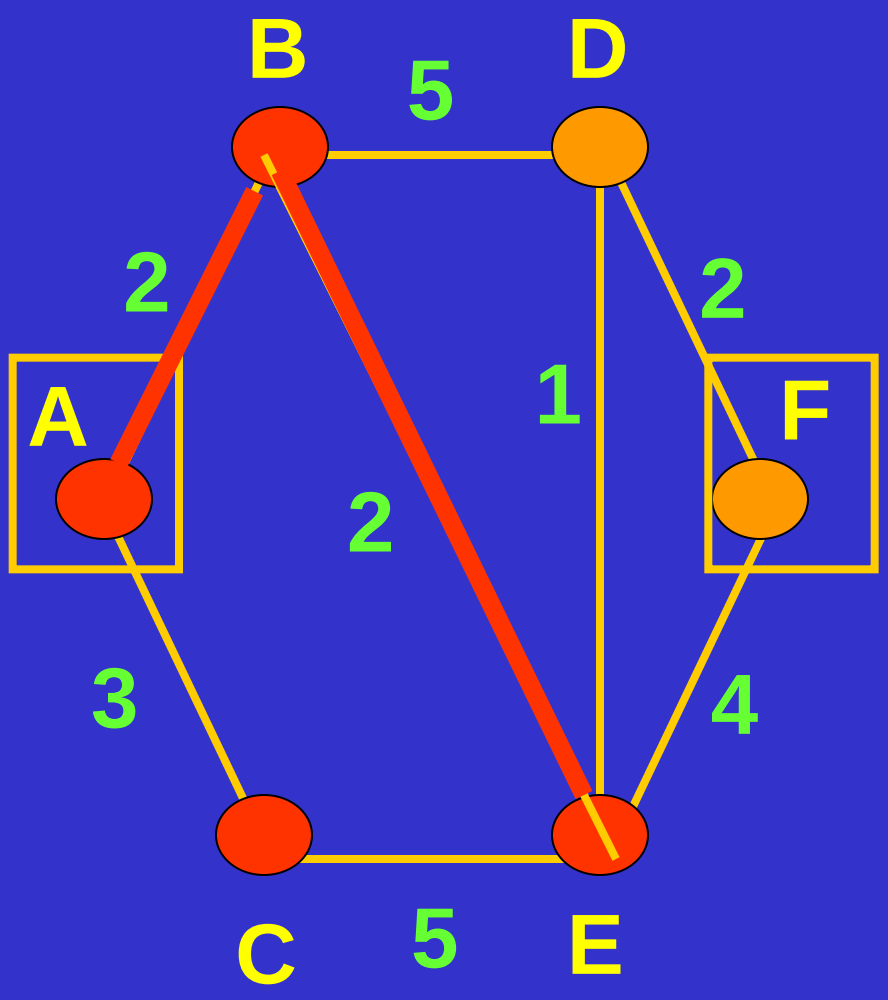


V_4	L_3	L_2
A*	-	-
B_A*	-	-
C_A*	-	(3)
D_B	7	7
E_B	4	4
F		∞

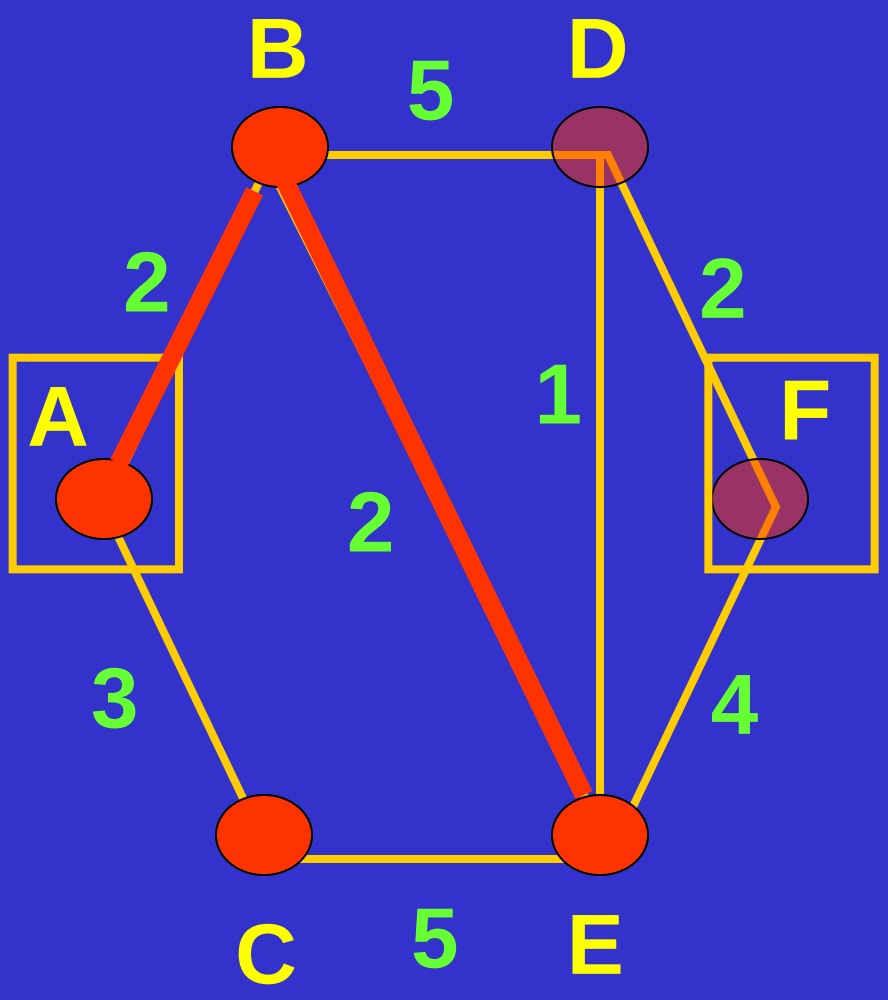
$L(E_C) = L(C_A^*) + w(C_A^*, E) = 3+5 = 8 > 4$ ...



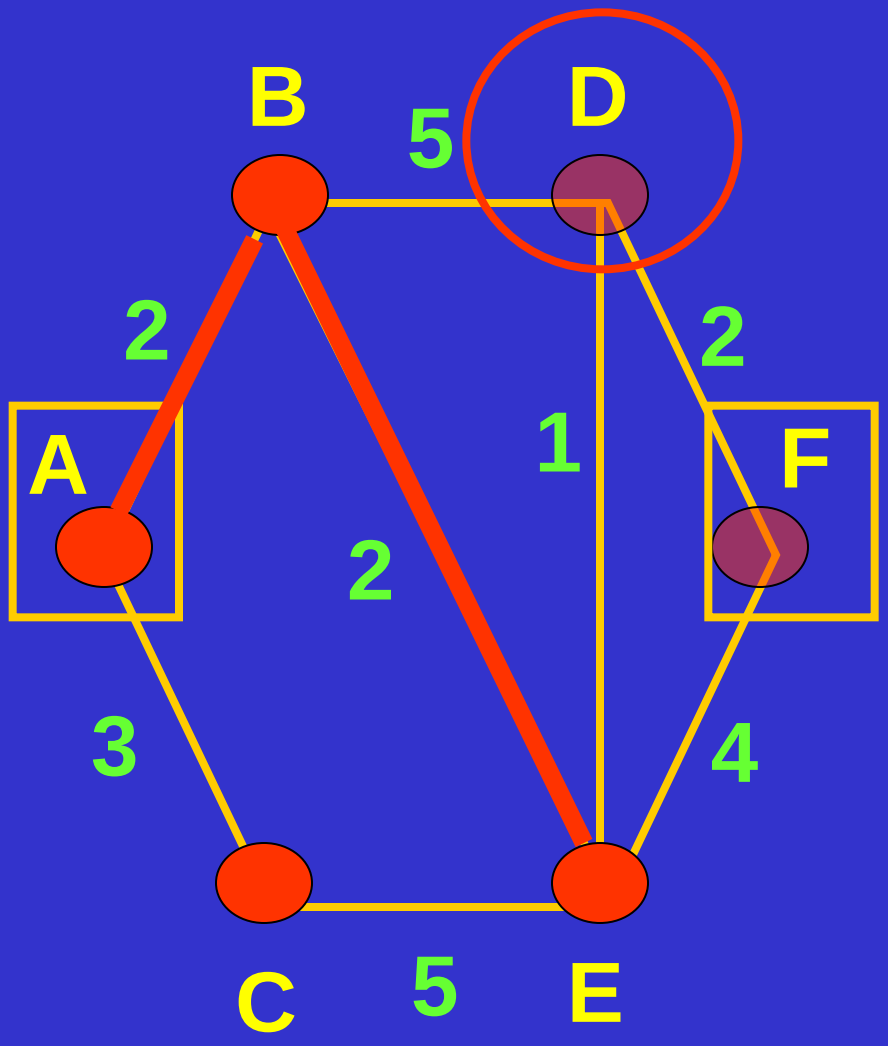
V_4	L_3
A*	-
B_A*	-
C_A*	-
D_B	7
E_B*	(4)
F	∞



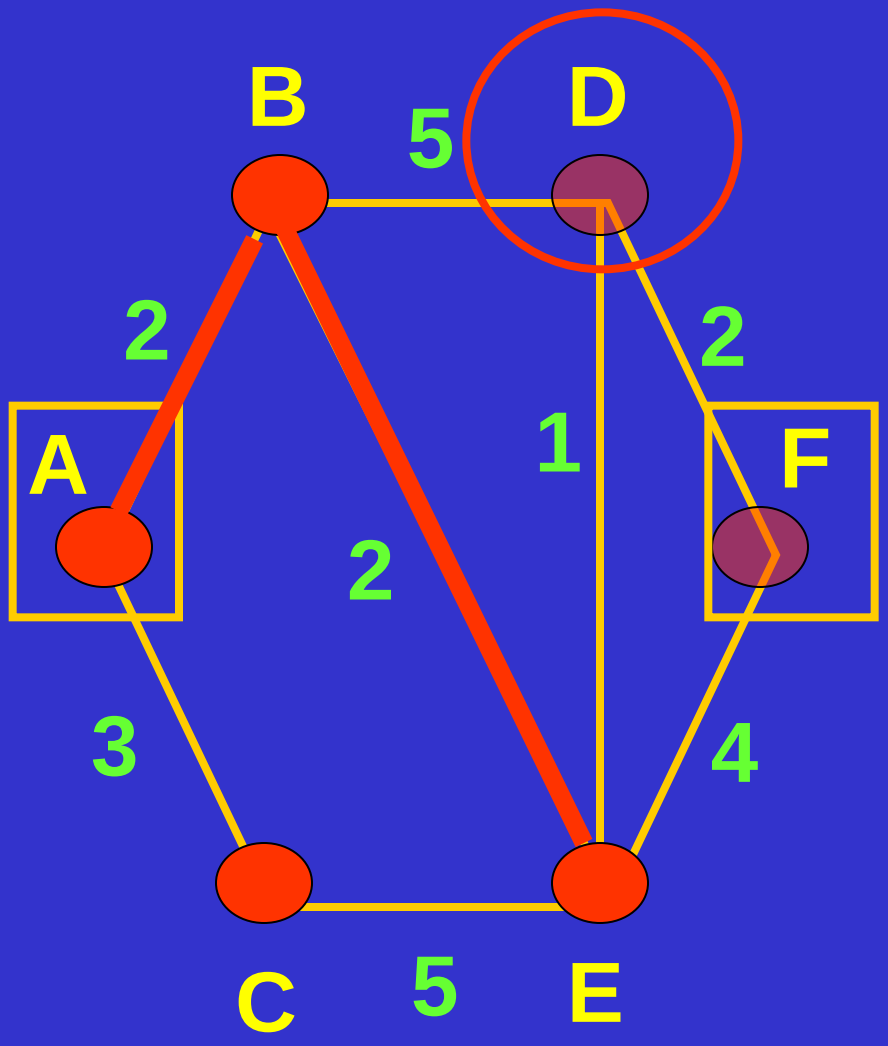
V_4	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_B	7	7
E_B*	-	(4)
F		∞



V_4	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_B	7	7
E_B*	-	(4)
F		∞

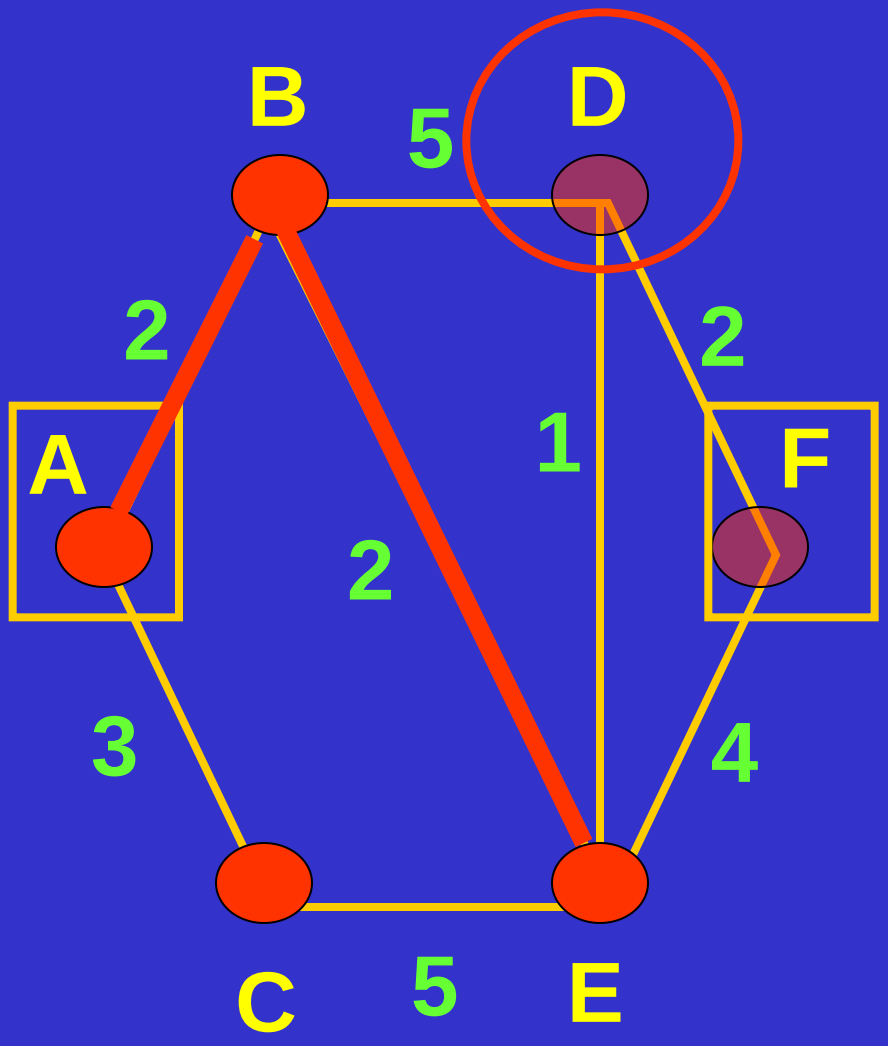


V_4	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_B	7	7
E_B*	-	(4)
F		∞



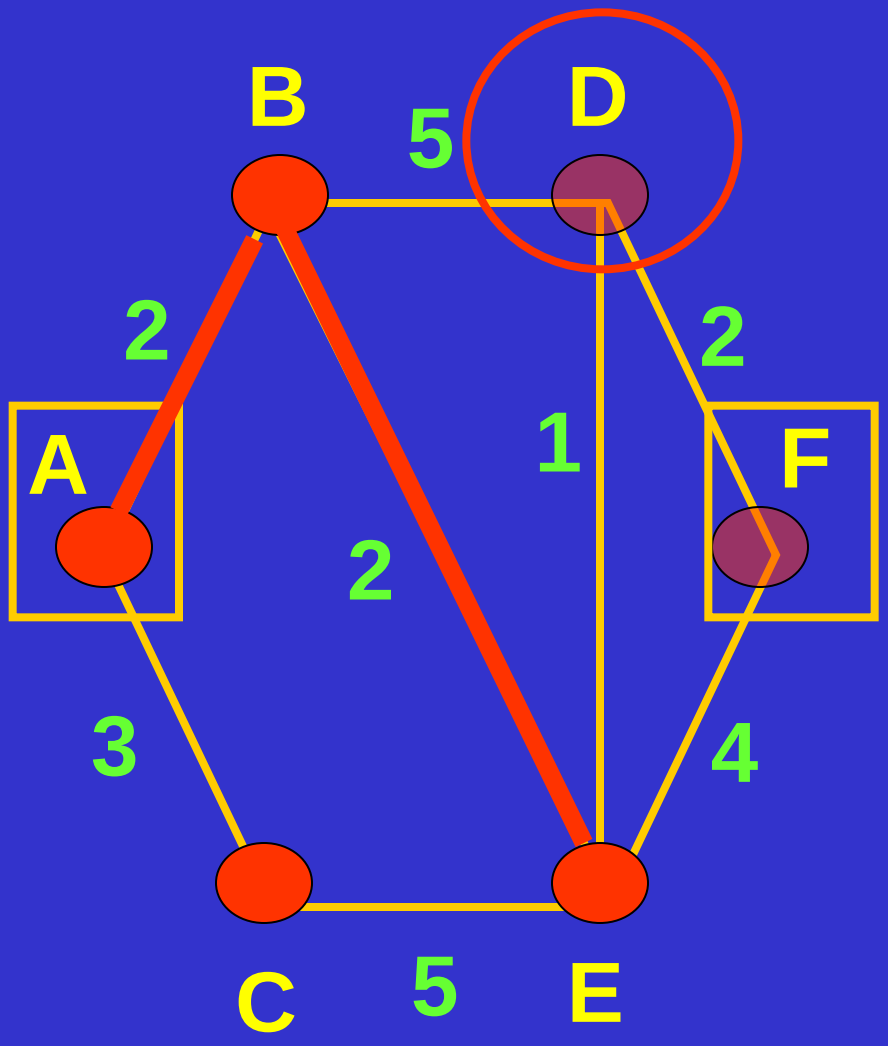
V_5	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_B	7	7
E_B*	-	(4)
F		∞

$L(D_E) = L(E_B^*) + w(E_B^*, D) = 4+1 = 5$



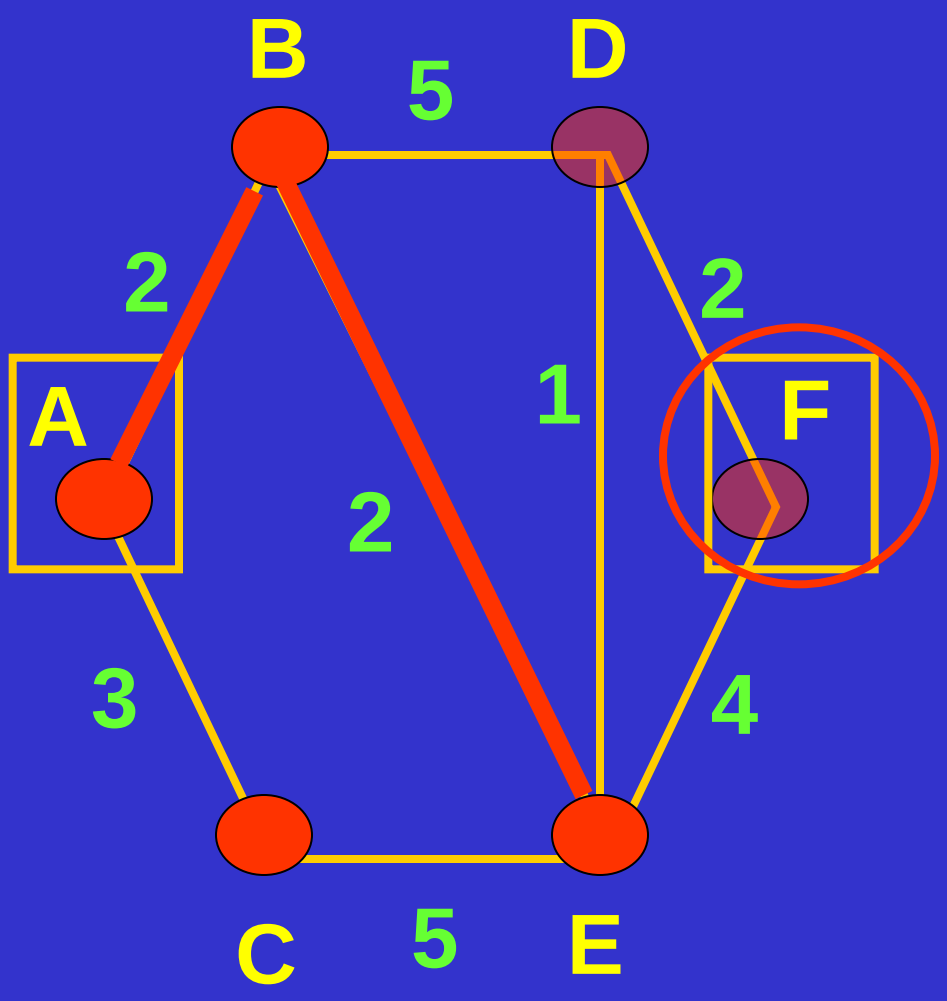
V_5	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_B	7	7
E_B*	-	(4)
F		∞

$L(D_E) = L(E_B^*) + w(E_B^*, D) = 4+1 = 5 < 7$



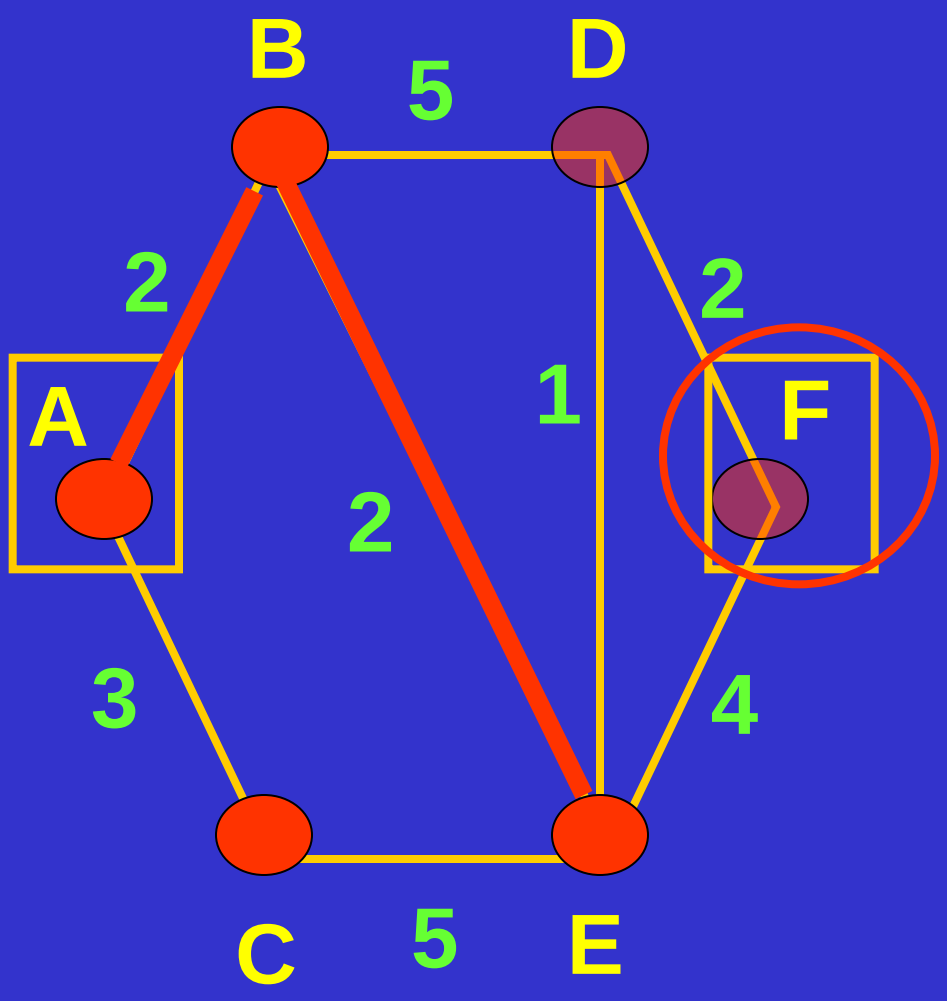
V_5	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_E	5	7
E_B*	-	(4)
F		∞

$L(D_E) = L(E_B^*) + w(E_B^*, D) = 4+1 = 5 < 7$



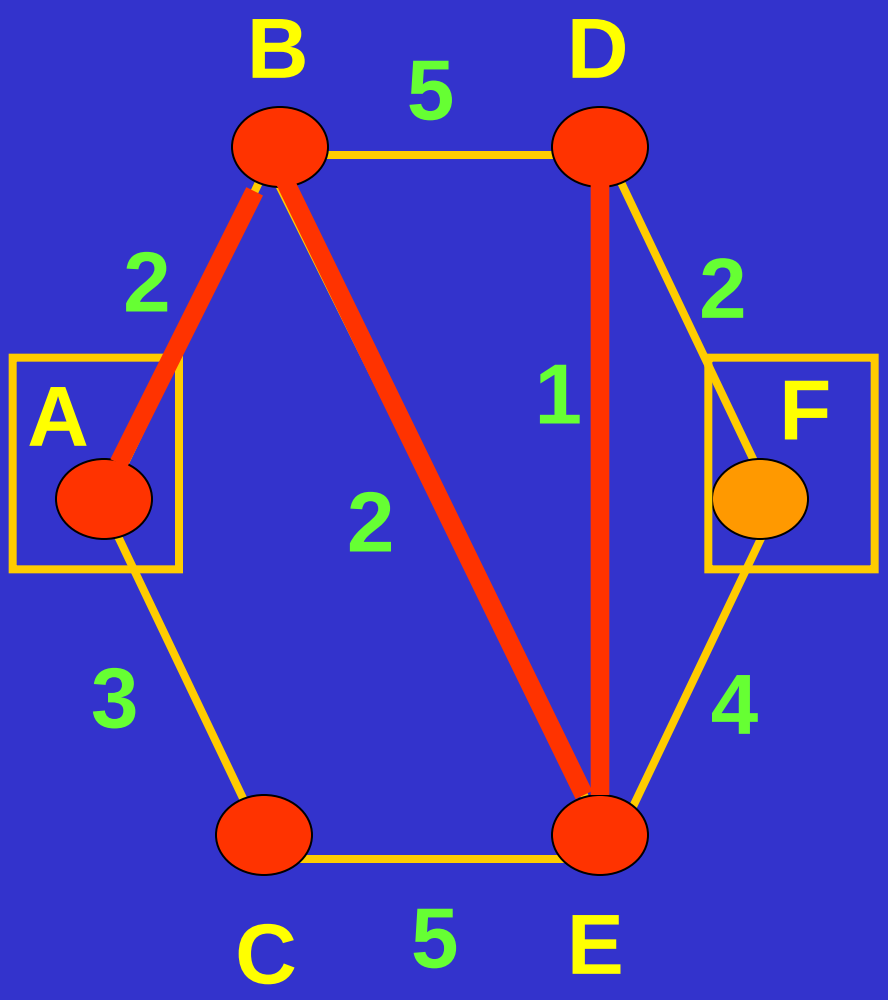
V_5	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_E	5	7
E_B*	-	(4)
F_E	8	∞

$L(F_E) = L(E_B^*) + w(E_B^*, F) = 4+4 = 8$

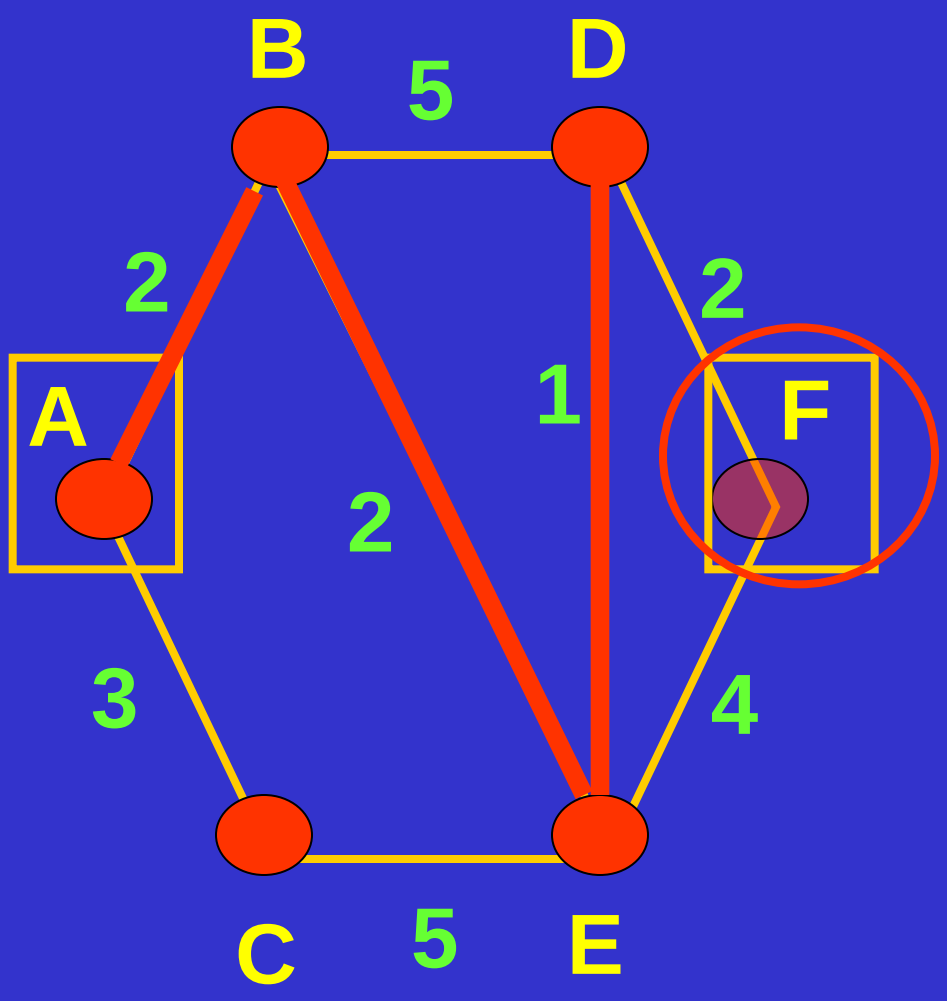


V_5	L_4	L_3
A*	-	-
B_A*	-	-
C_A*	-	-
D_E	5	7
E_B*	-	(4)
F_E	8	∞

$L(F_E) = L(E_B^*) + w(E_B^*, F) = 4+4 = 8$

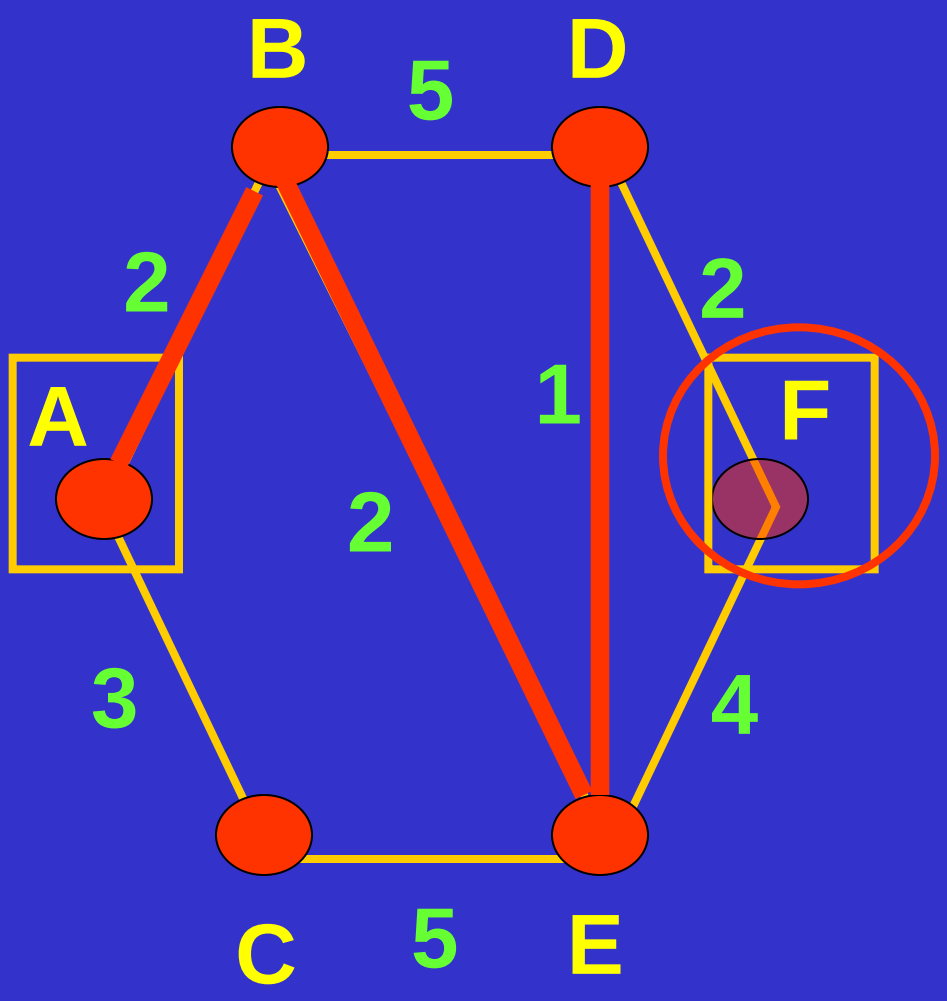


V_5	L_4
A*	-
B_A*	-
C_A*	-
D_E *	(5)
E_B*	-
F_E	8



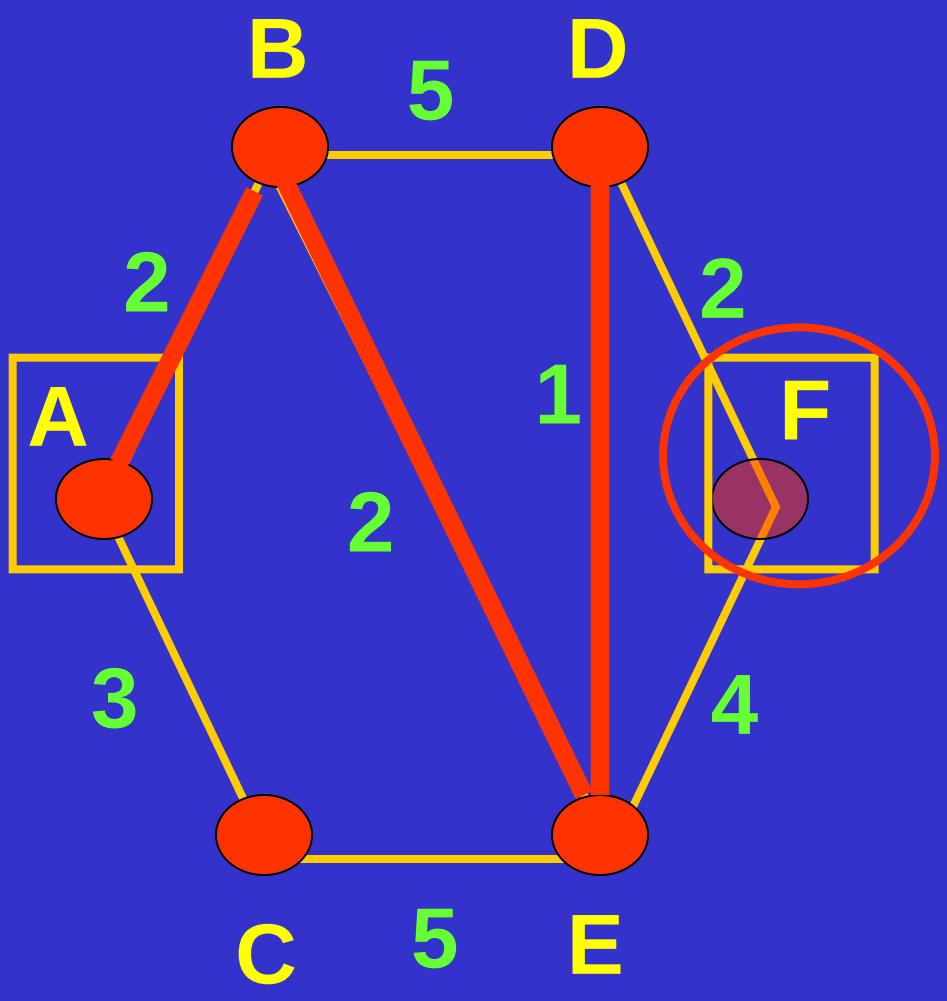
V_6	L_5	L_4
A*	-	-
B_A*	-	-
C_A*	-	-
D_E *	-	(5)
E_B*	-	-
F_E	8	8

$L(F_D) = L(D_E^*) + w(D_E^*, F) = 5+2 = 7$



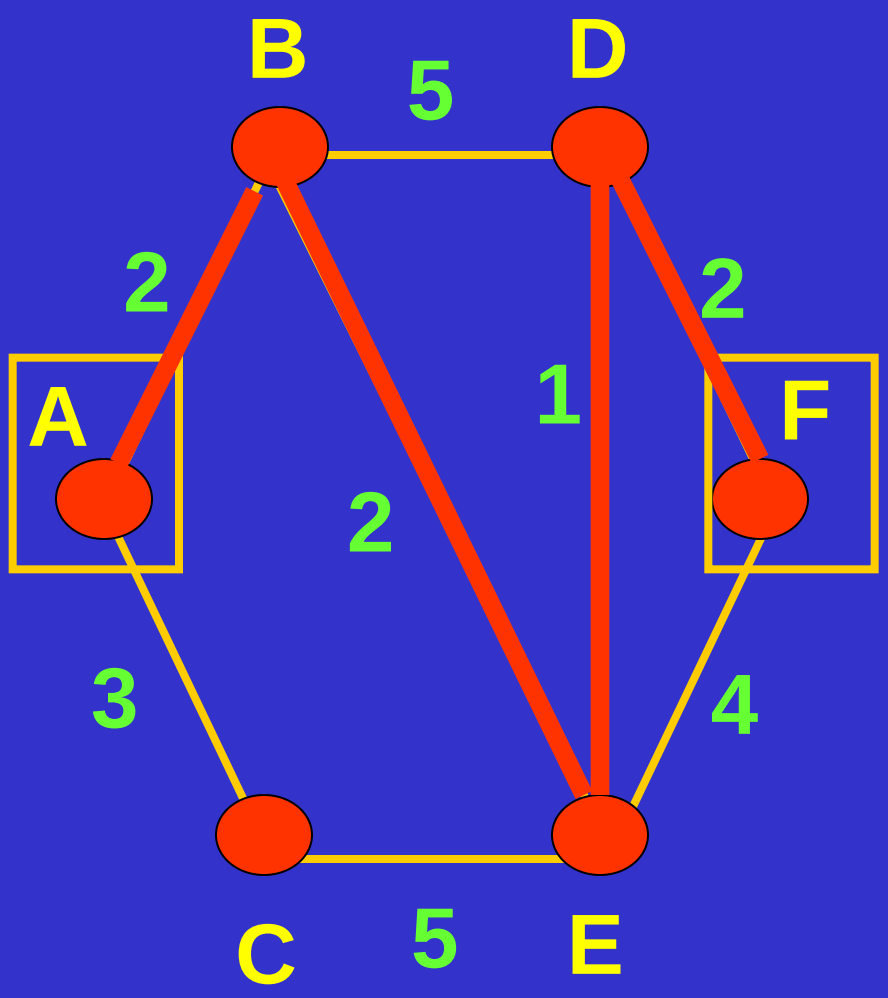
V_6	L_5	L_4
A*	-	-
B_A*	-	-
C_A*	-	-
D_E *	-	(5)
E_B*	-	-
F_E	8	8

$L(F_D) = L(D_E^*) + w(D_E^*, F) = 5+2 = 7 < 8$ ...



V_6	L_5	L_4
A*	-	-
B_A*	-	-
C_A*	-	-
D_E *	-	(5)
E_B*	-	-
F_D	7	8

$L(F_D) = L(D_E^*) + w(D_E^*, F) = 5+2 = 7 < 8$ ...



V_6	L_5
A*	-
B_A*	-
C_A*	-
D_E*	-
E_B*	-
F_D*	(7)