ANÁLISIS DE ALGORITMOS

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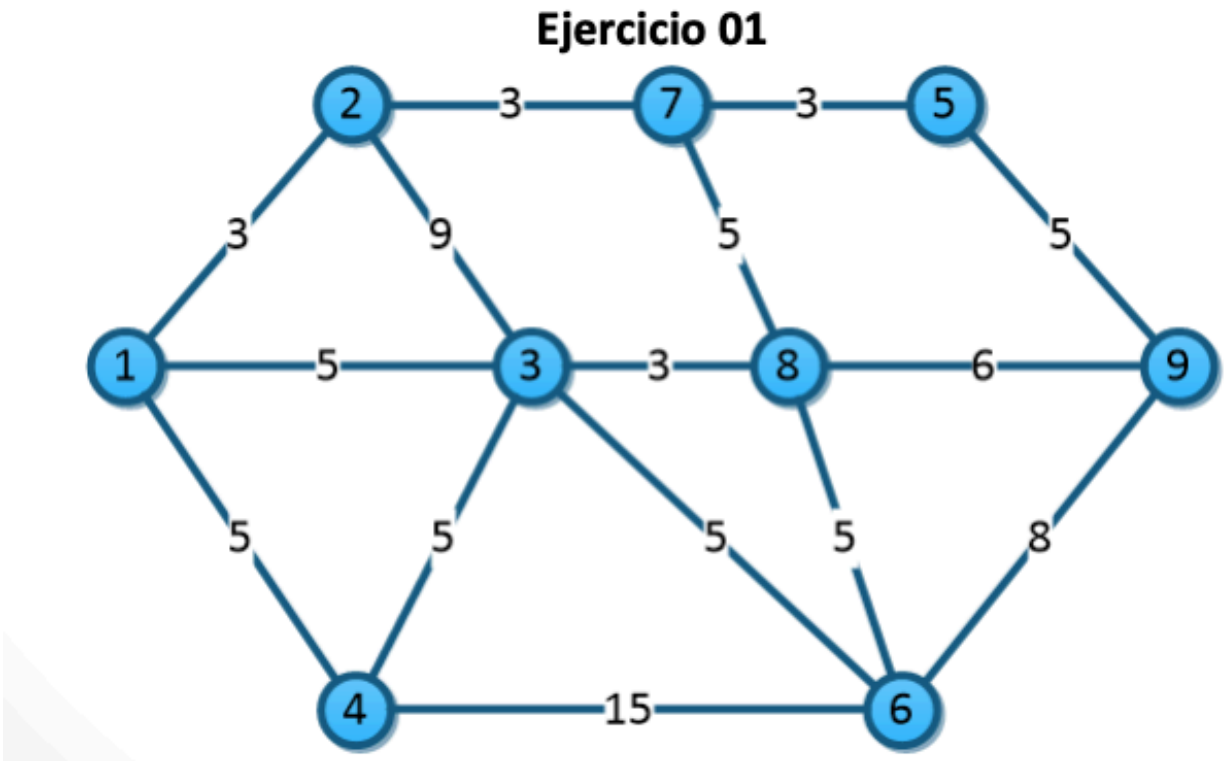
Grupo 3CM3

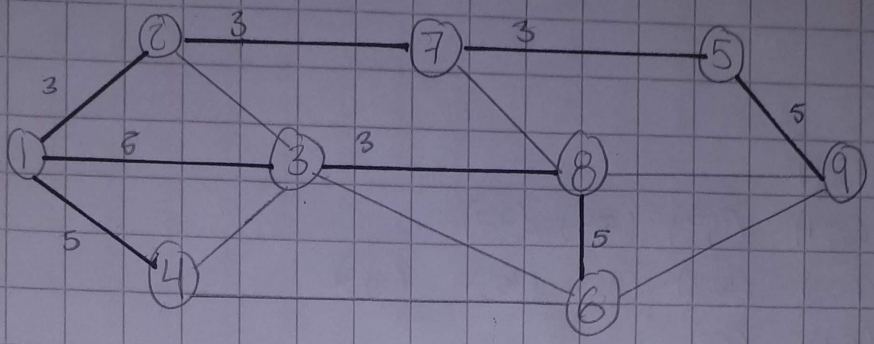
Ejercicio 09: Prim, Kruskal, Dijkstra

- Para los siguientes 5 grafos encontrar la ruta más corta del nodo (1 o A) a todos los nodos (Dijkstra) y el árbol recubridor mínimo mediante Prim y Kruskal (MST).

- Describir de manera detallada los algoritmos y sus pasos.



Prim

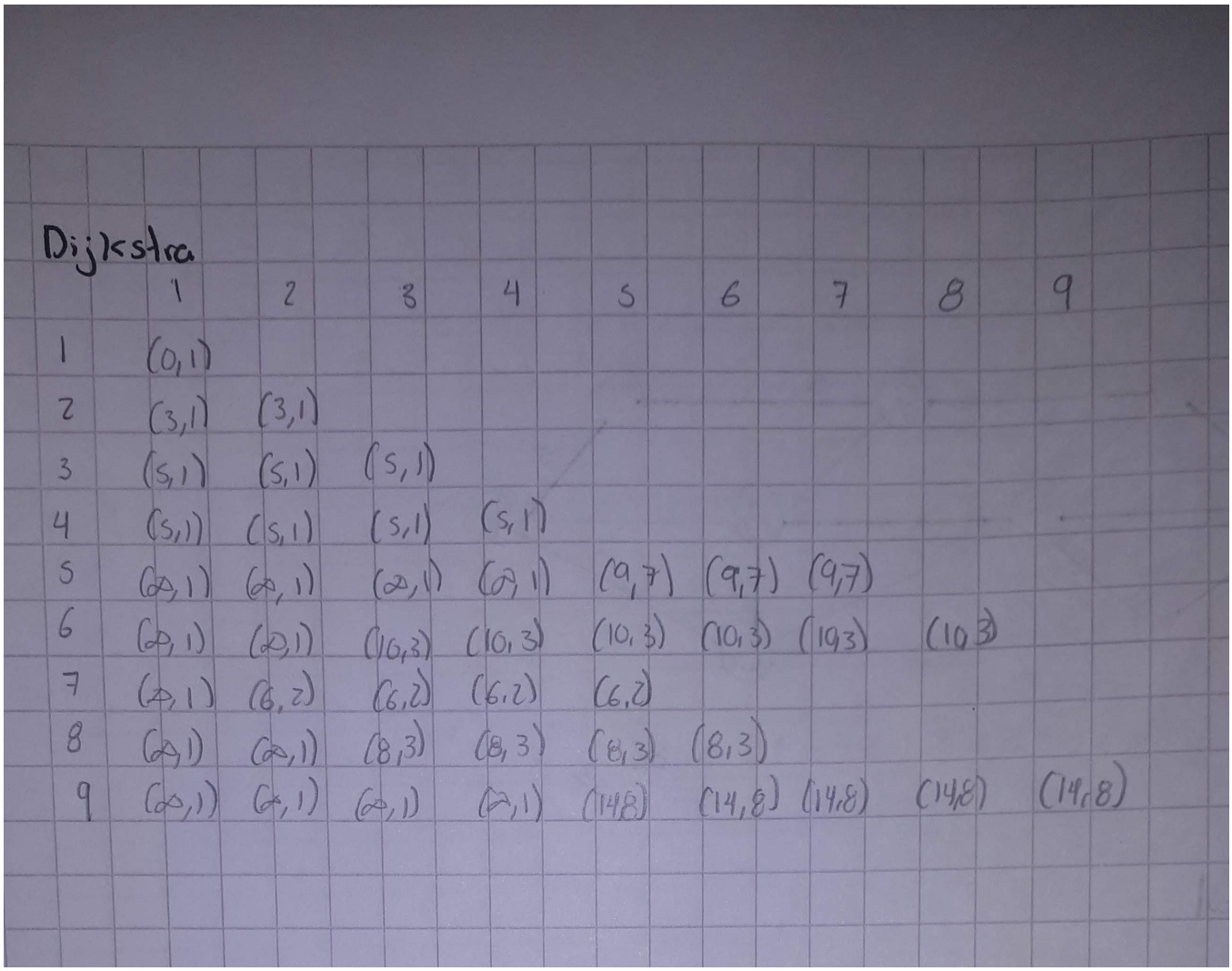


Total = 3+5+5+3+3+3+5 = 32

Kruskal

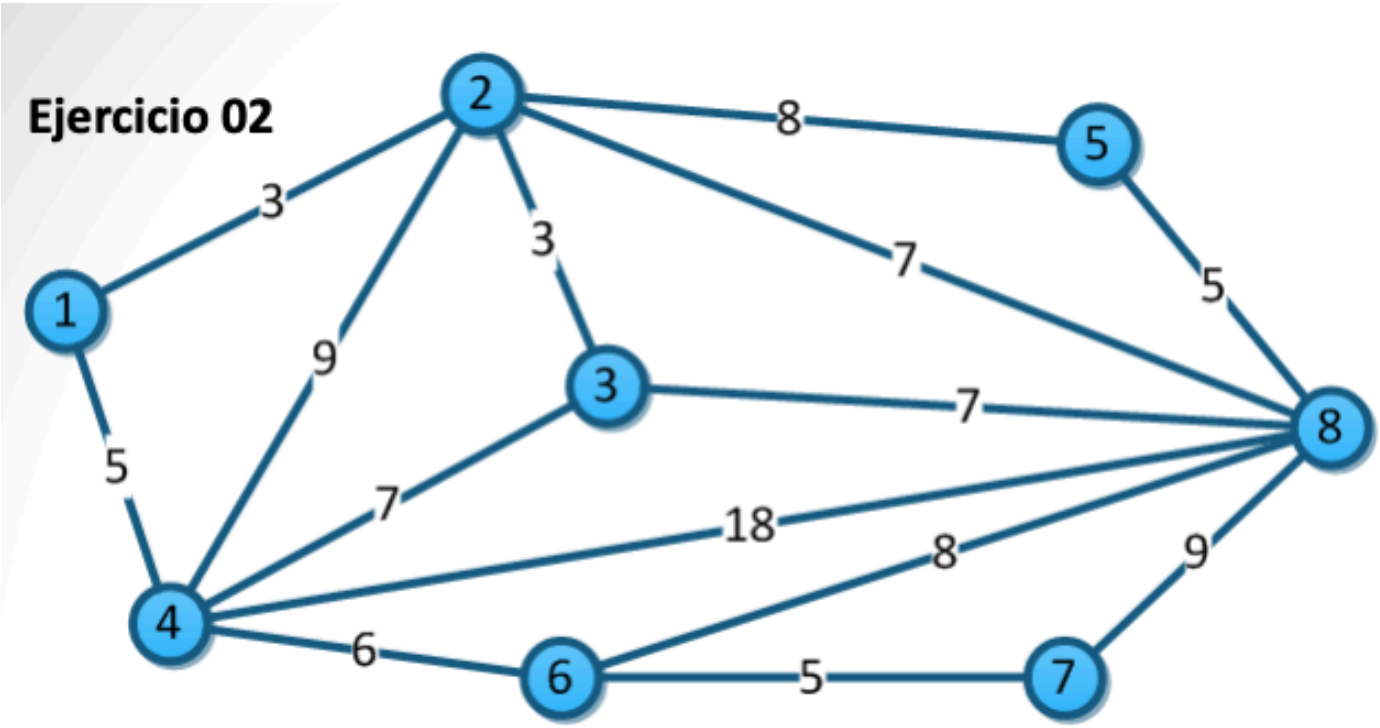
(1,2) = 3
(2,7) = 3
(3,8) = 3
(7,5) = 3
(1,3) = 5
(1,4) = 5
(3,4) = 5
(3,6) = 5
(7,8) = 5
(8,6) = 5
(5,9) = 5
(8,9) = 6
(6,9) = 8
(2,3) = 9
(4,6) = 15

Total = 3+5+5+3+5+3+5+3 = 32



Dijkstra

	1	2	3	4	5	6	7	8	9
1	(0,1)								
2	(3,1)	(3,1)							
3	(5,1)	(5,1)	(5,1)						
4	(5,1)	(5,1)	(5,1)	(5,1)					
5	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(9,7)	(9,7)	(9,7)		
6	(∞,1)	(∞,1)	(10,3)	(10,3)	(10,3)	(10,3)	(19,3)	(10,3)	
7	(∞,1)	(6,2)	(6,2)	(6,2)	(6,2)				
8	(∞,1)	(∞,1)	(8,3)	(8,3)	(8,3)	(8,3)			
9	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(14,8)	(14,8)	(14,8)	(14,8)	(14,8)


Ejercicio 02
1
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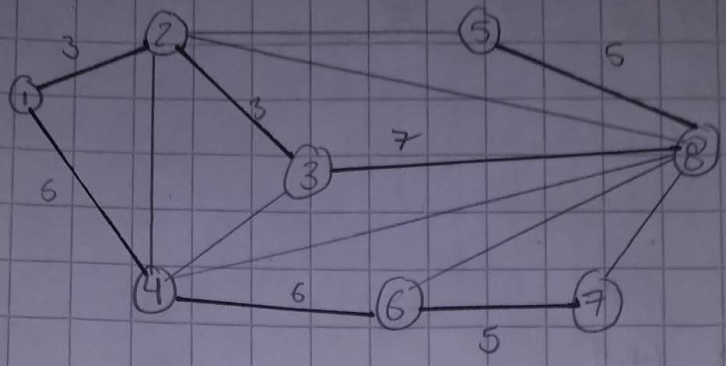
5

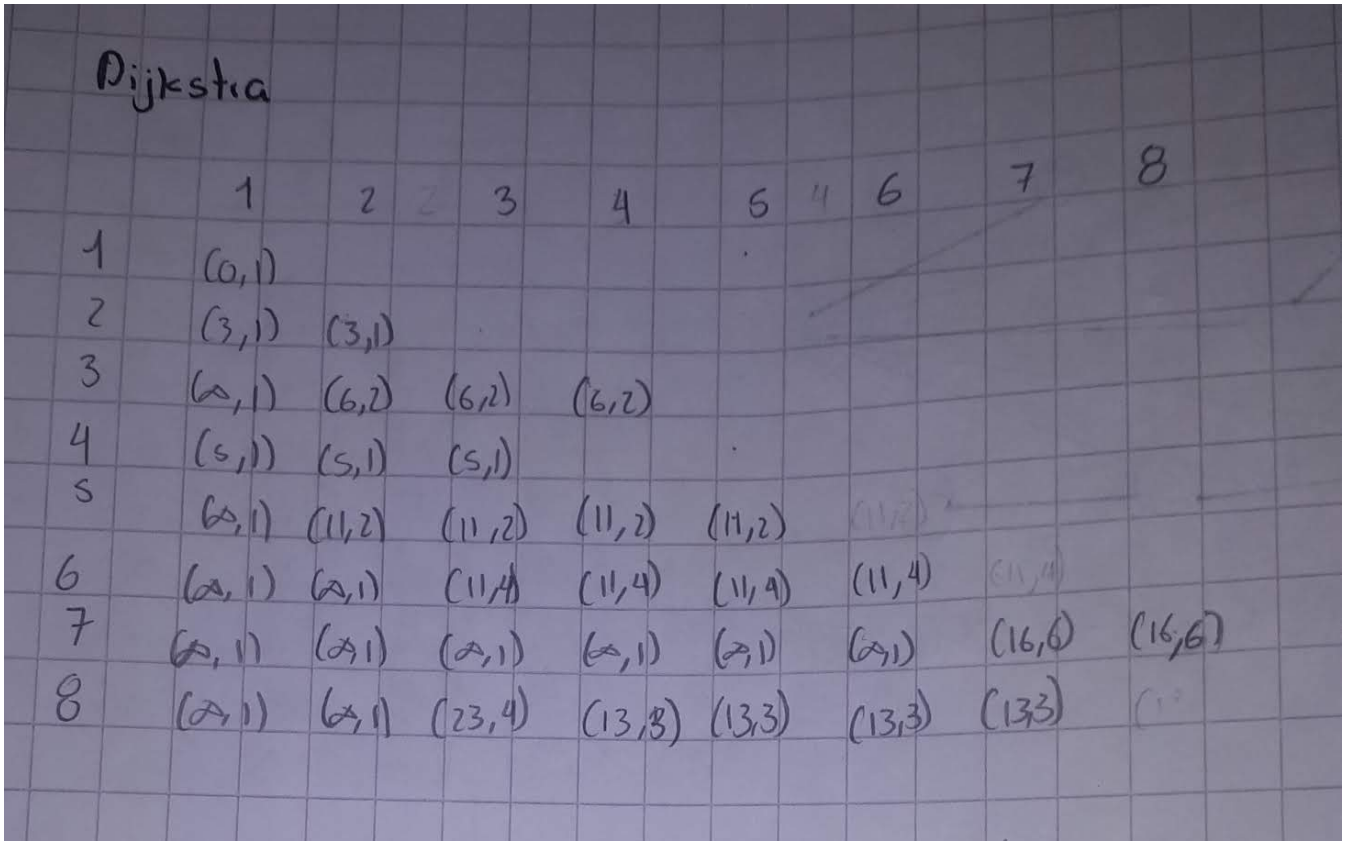
Prim



Total = 6 + 5 + 7 + 5 + 3 + 3 + 5 = 34

Kruskal

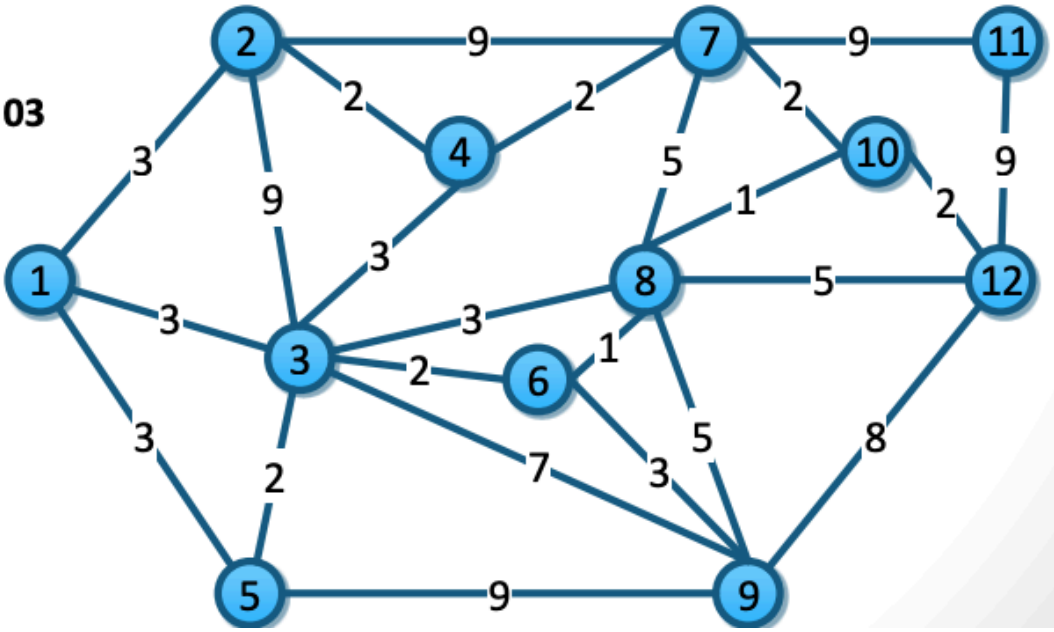
(1,2) = 3 ←
(2,3) = 3 ←
(5,8) = 5 ←
(1,4) = 5 ←
(6,7) = 5 ←
(4,6) = 6 ←
(3,4) = 7
(3,8) = 7 ←
(2,8) = 7
(6,8) = 8
(2,5) = 8
(7,8) = 9
(2,4) = 9
(4,8) = 10



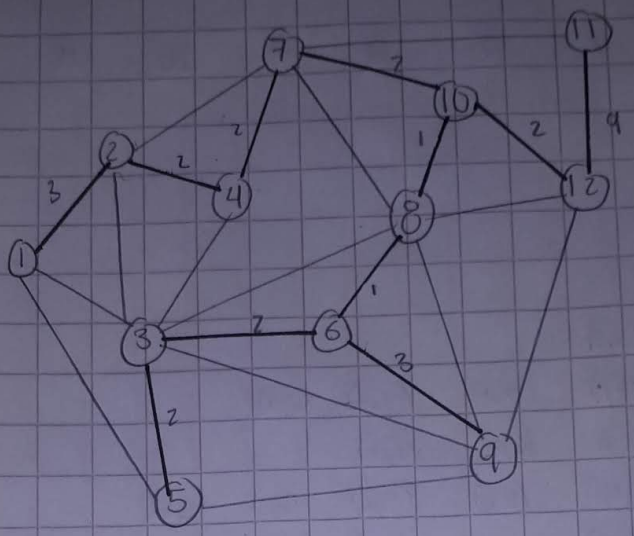
Dijkstra

	1	2	3	4	5	6	7	8
1	(0,1)							
2	(3,1)	(3,1)						
3	(∞,1)	(6,2)	(6,2)	(6,2)				
4	(5,1)	(5,1)	(5,1)					
5	(∞,1)	(11,2)	(11,2)	(11,2)	(11,2)			
6	(∞,1)	(∞,1)	(11,4)	(11,4)	(11,4)	(11,4)		
7	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(16,6)	(16,6)
8	(∞,1)	(∞,1)	(23,4)	(13,3)	(13,3)	(13,3)	(13,3)	

Ejercicio 03



Prim



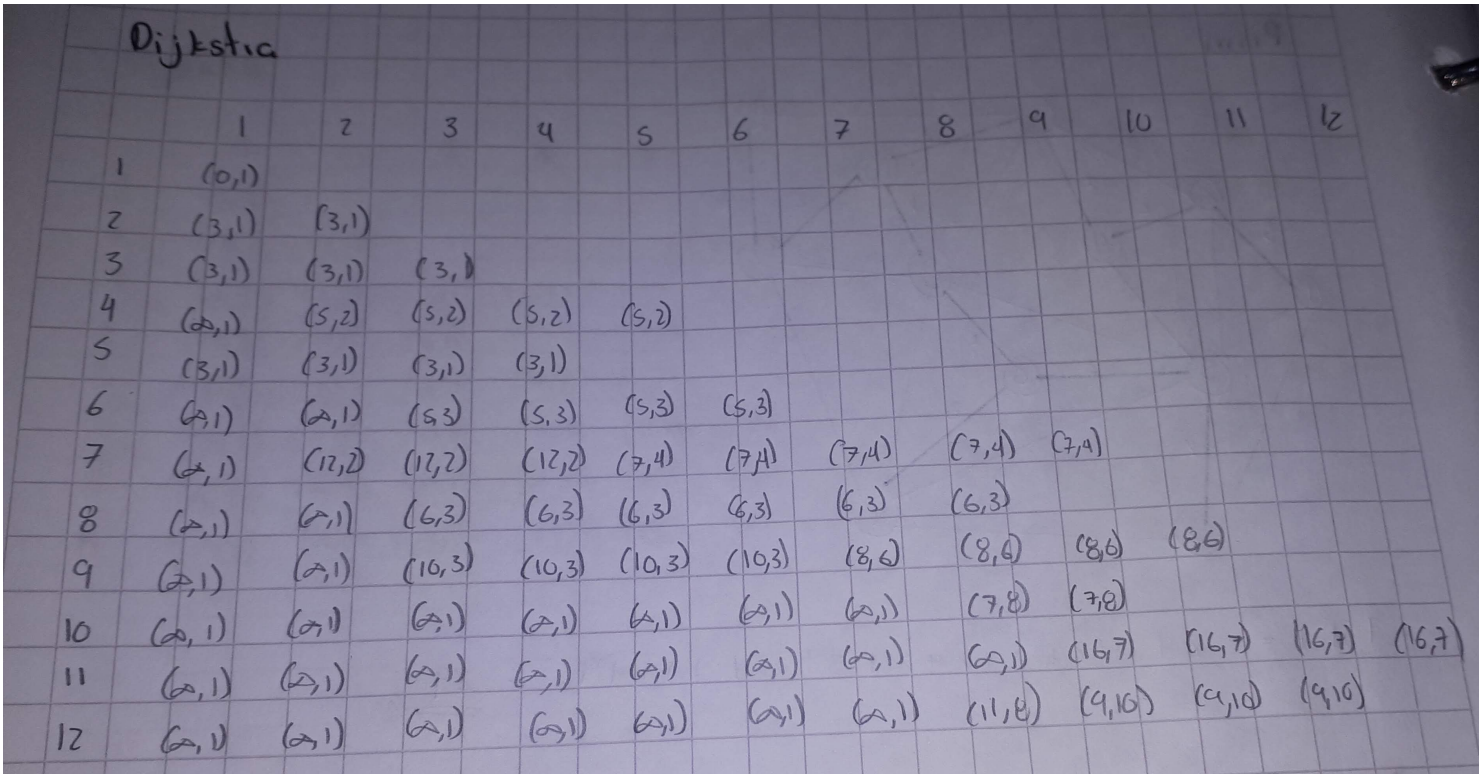
Total = 2 + 2 + 2 + 2 + 2 + 2 + 3 + 3 + 1 + 1 + 9 = 29

Kruskal

(6,8) = 1 ←
(8,10) = 1 ←
(7,10) = 2 ←
(10,12) = 2 ←
(4,7) = 2 ←
(2,4) = 2 ←
(3,6) = 2 ←
(3,5) = 2 ←
(1,12) = 3 ←
(1,3) = 3
(1,5) = 3
(3,4) = 3
(3,8) = 3
(6,9) = 3 ←

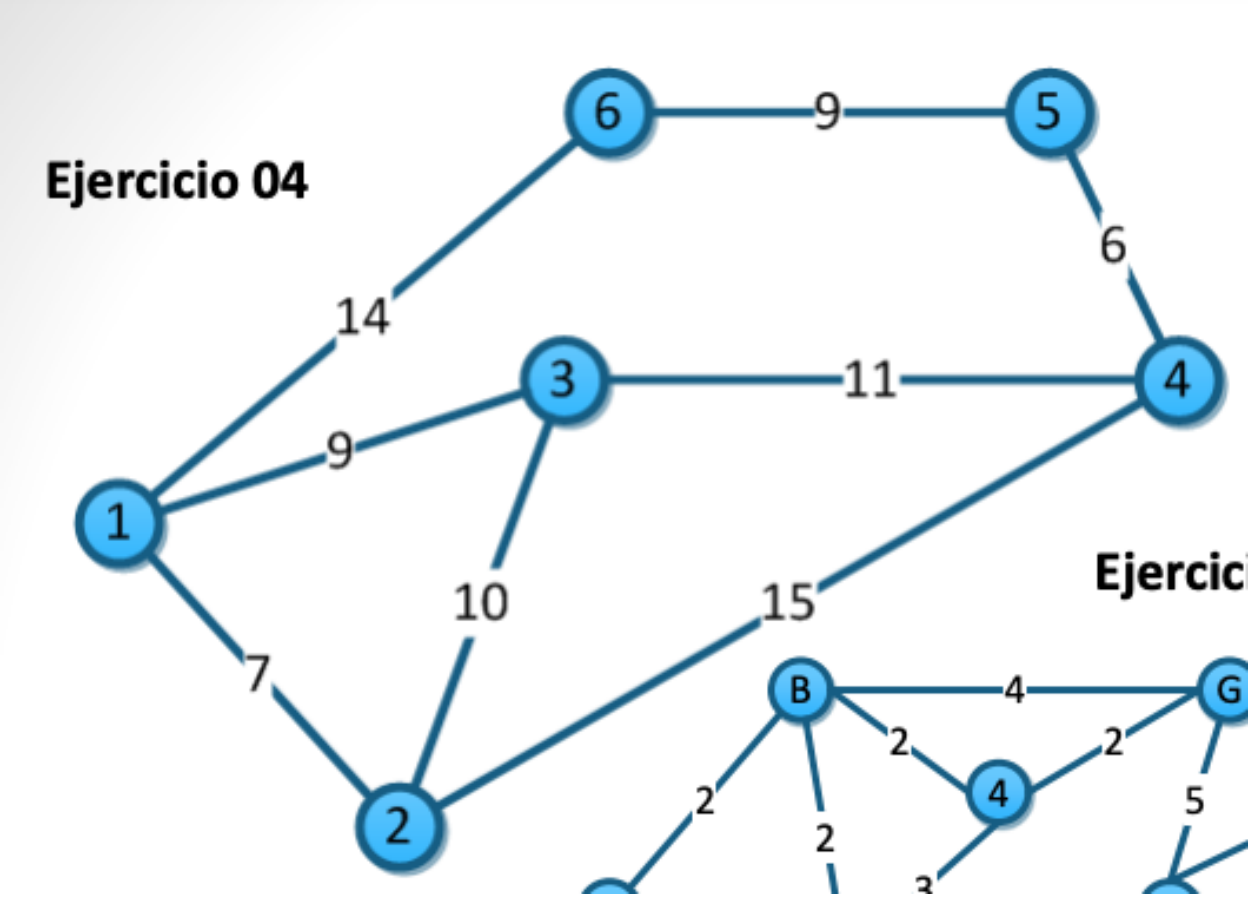
(8,9) = 5
(8,12) = 5
(7,8) = 6
(3,9) = 7
(9,12) = 8
(11,12) = 9 ←
(7,11) = 9
(5,9) = 9
(2,3) = 9
(2,7) = 9

Total = 29



Dijkstra

	1	2	3	4	5	6	7	8	9	10	11	12
1	(0,1)											
2	(3,1)	(3,1)										
3	(3,1)	(3,1)	(3,1)									
4	(∞,1)	(5,2)	(5,2)	(5,2)	(5,2)							
5	(3,1)	(3,1)	(3,1)	(3,1)								
6	(∞,1)	(∞,1)	(5,3)	(5,3)	(5,3)	(5,3)						
7	(∞,1)	(12,2)	(12,2)	(12,2)	(7,4)	(7,4)	(7,4)	(7,4)	(7,4)			
8	(∞,1)	(∞,1)	(6,3)	(6,3)	(6,3)	(6,3)	(6,3)	(6,3)				
9	(∞,1)	(∞,1)	(10,3)	(10,3)	(10,3)	(10,3)	(8,6)	(8,6)	(8,6)	(8,6)		
10	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(7,8)	(7,8)			
11	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(16,7)	(16,7)	(16,7)	(16,7)
12	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(∞,1)	(11,8)	(9,10)	(9,10)	(9,10)	


Ejercicio 04
6
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Ejercic
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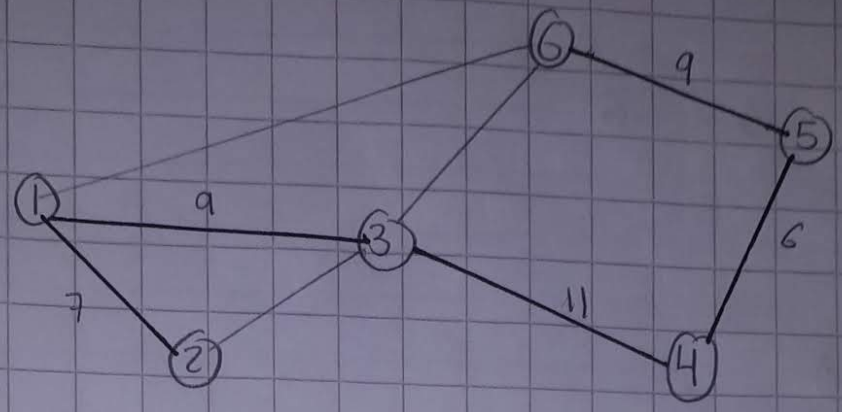
2

Prim

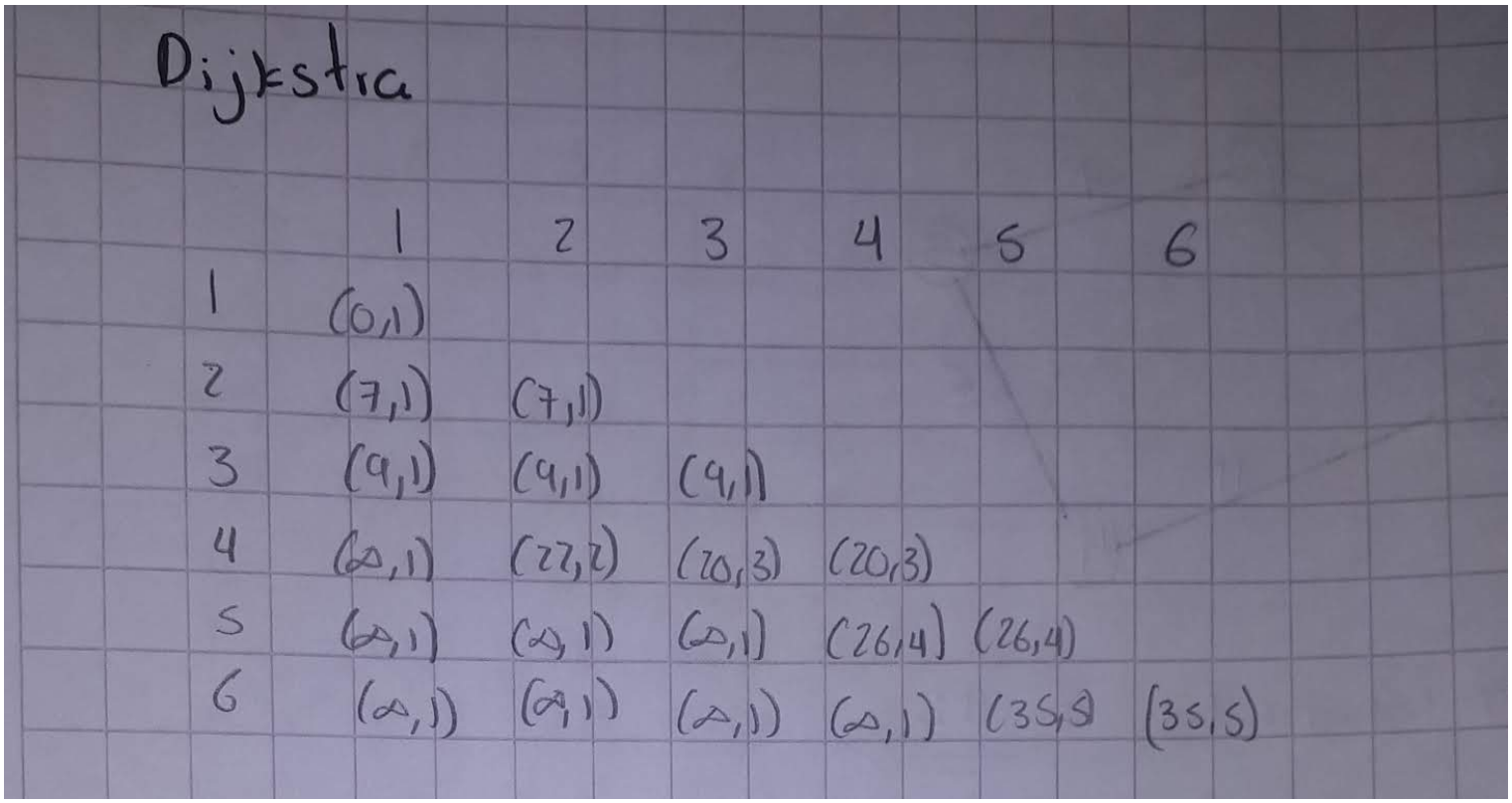


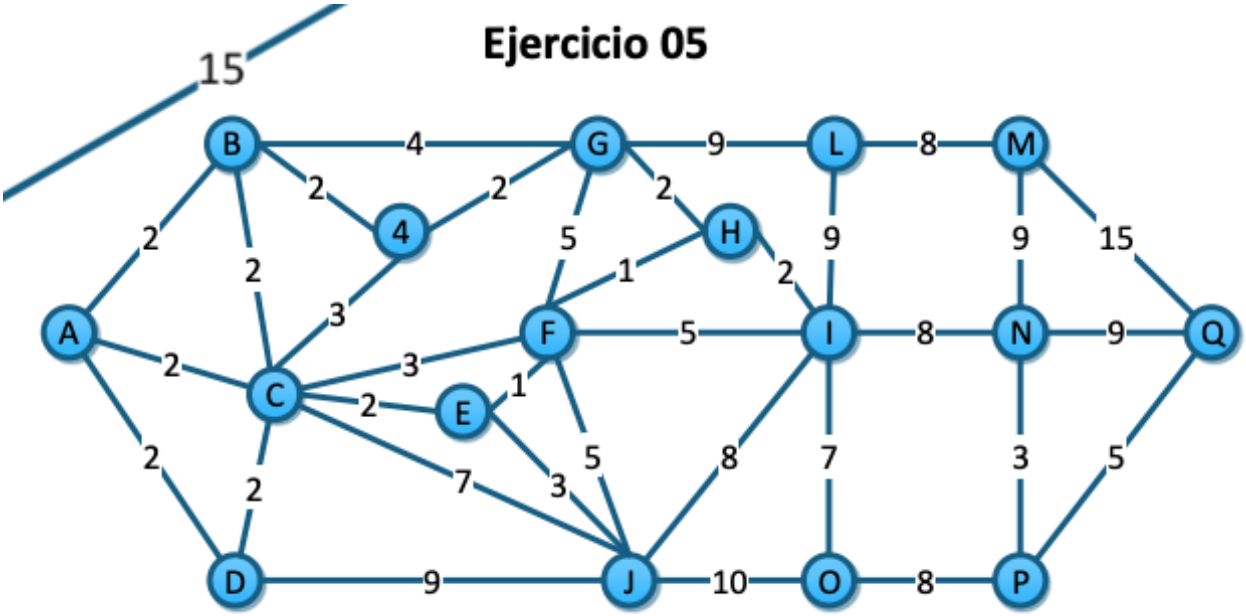
Total = 11 + 9 + 9 + 6 + 7 = 42

Kroskal

(5,4) = 6 ←
(1,2) = 7 ←
(6,5) = 9 ←
(1,3) = 9 ←
(2,3) = 10
(4,3) = 11 ←
(1,6) = 14
(2,4) = 15

Total = 6 + 7 + 9 + 9 + 11 = 42


Dijkstra
1 2 3 4 5 6
1 (0,1)
2 (7,1) (7,1)
3 (9,1) (9,1) (9,1)
4 (∞,1) (22,2) (20,3) (20,3)
5 (∞,1) (∞,1) (∞,1) (26,4) (26,4)
6 (∞,1) (∞,1) (∞,1) (∞,1) (35,5) (35,5)


Ejercicio 05
15
A
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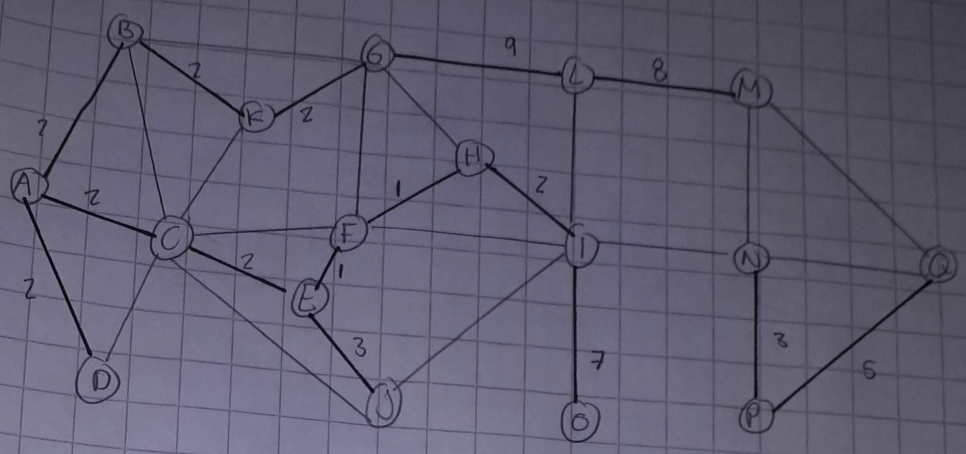
9
10
8

Prim



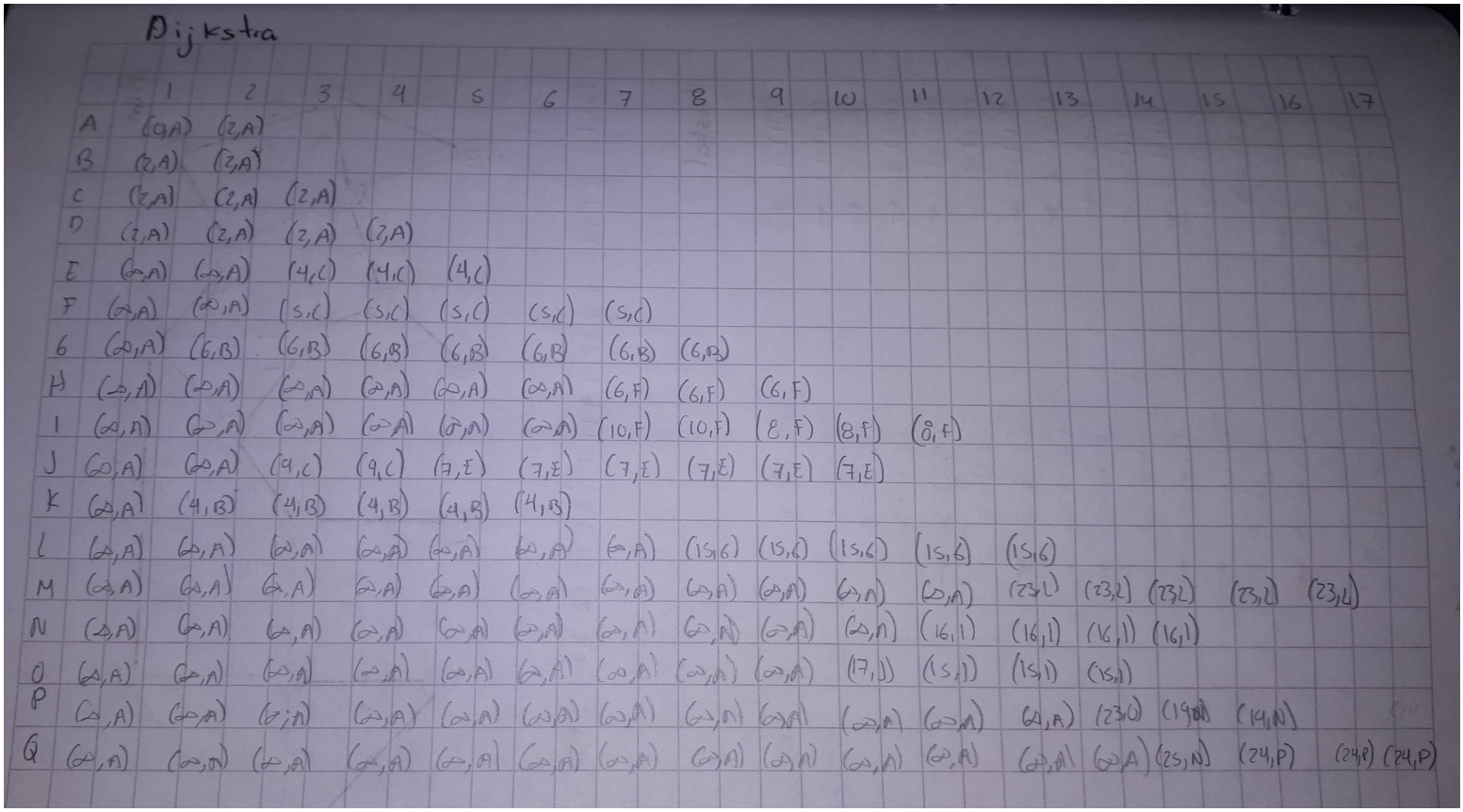
Total = 5+3+8+7+12+9+1+3+1+2+2+2+2+27 2 = 59

Kruskal

(F,H) = 1 ←
(E,F) = 1 ←
(A,B) = 2 ←
(A,C) = 2 ←
(A,Z) = 2 ←
(B,C) = 2
(B,K) = 2 ←
(K,G) = 2 ←
(C,E) = 2 ←
(G,H) = 2
(H,I) = 2 ←
(C,D) = 2
(C,K) = 3
(C,F) = 3 ←
(E,J) = 3 ←
(N,P) = 3 ←

(B,G) = 4
(F,G) = 5
(F,J) = 5
(F,I) = 5
(P,Q) = 5 ←
(C,J) = 7
(I,O) = 7 ←
(J,I) = 8
(O,P) = 8 ←
(I,N) = 8
(L,M) = 8 ←
(G,L) = 9 ←
(L,I) = 9
(M,N) = 9 ←
(D,J) = 9
(N,Q) = 9

(J,O) = 10
(M,Q) = 15


Dijkstra
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
A (9,A) (2,A)
B (2,A) (2,A)
C (2,A) (2,A) (2,A)
D (2,A) (2,A) (2,A) (2,A)
E (∞,A) (∞,A) (4,C) (4,C) (4,C)
F (∞,A) (∞,A) (5,C) (5,C) (5,C) (5,C) (5,C)
G (∞,A) (6,B) (6,B) (6,B) (6,B) (6,B) (6,B) (6,B)
H (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (6,F) (6,F) (6,F)
I (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (10,F) (10,F) (8,F) (8,F) (8,F)
J (∞,A) (∞,A) (9,C) (9,C) (7,E) (7,E) (7,E) (7,E) (7,E) (7,E)
K (∞,A) (4,B) (4,B) (4,B) (4,B) (4,B)
L (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (15,G) (15,G) (15,G) (15,G) (15,G)
M (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (23,L) (23,L) (23,L) (23,L) (23,L)
N (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (16,I) (16,I) (16,I) (16,I)
O (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (17,J) (15,I) (15,I) (15,I)
P (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (24,A) (23,O) (19,O) (19,N)
Q (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (∞,A) (25,N) (24,P) (24,P) (24,P)