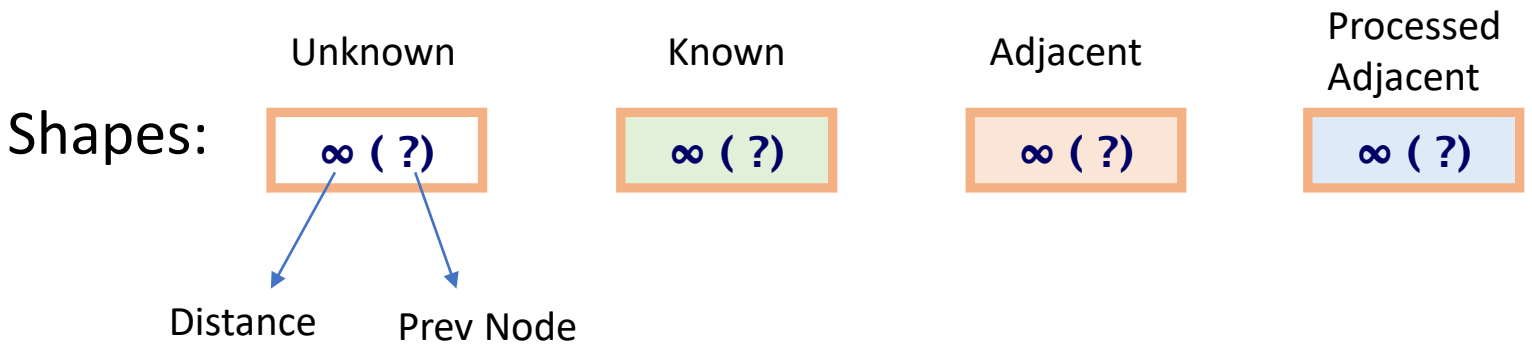
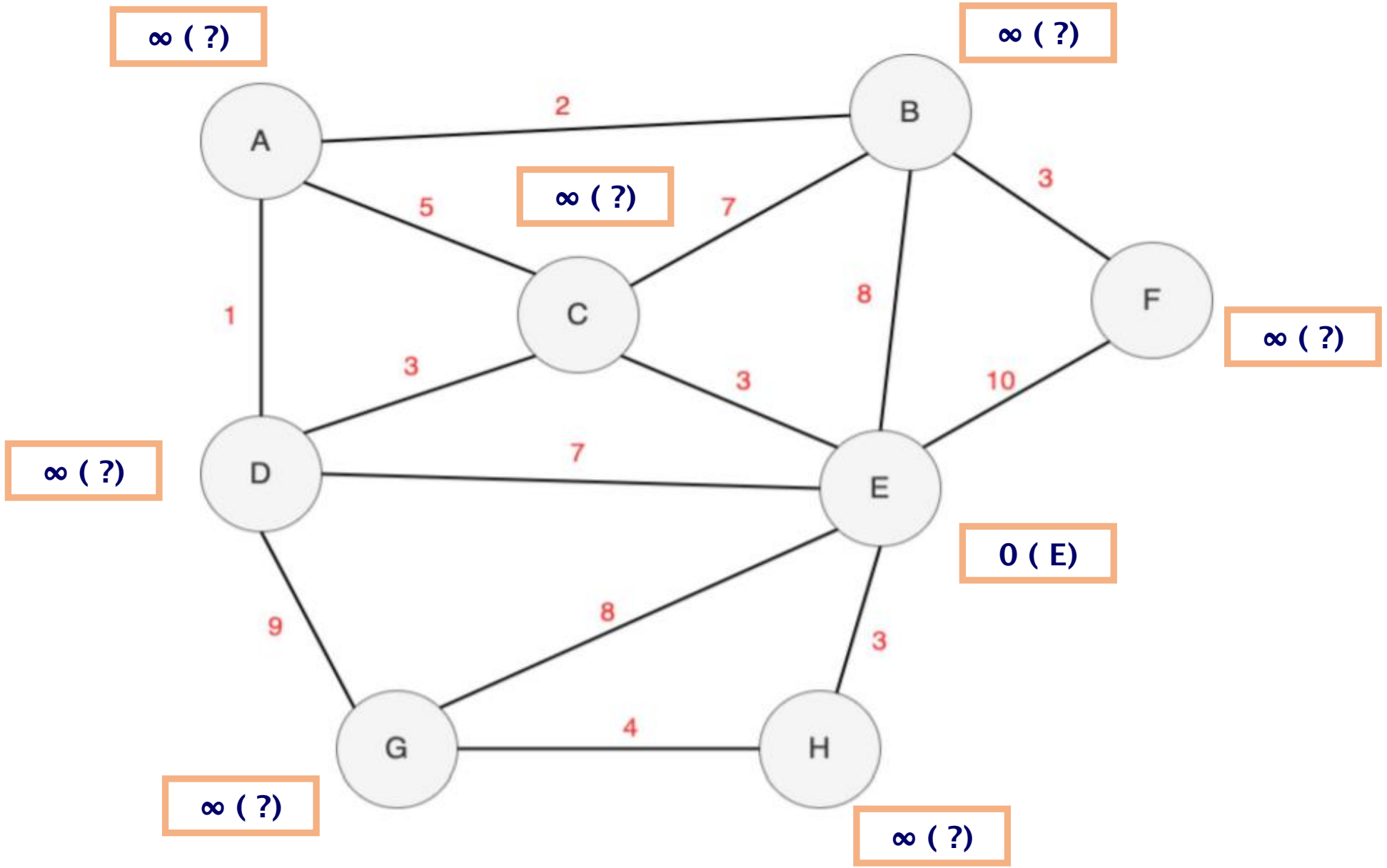
CS300 Data Structures

Assignment #5

Muhammed Orhun Gale - 26754

Question 1: Trace the operation of Dijkstra's weighted shortest path algorithm for the following graph. Use vertex E as your start vertex.

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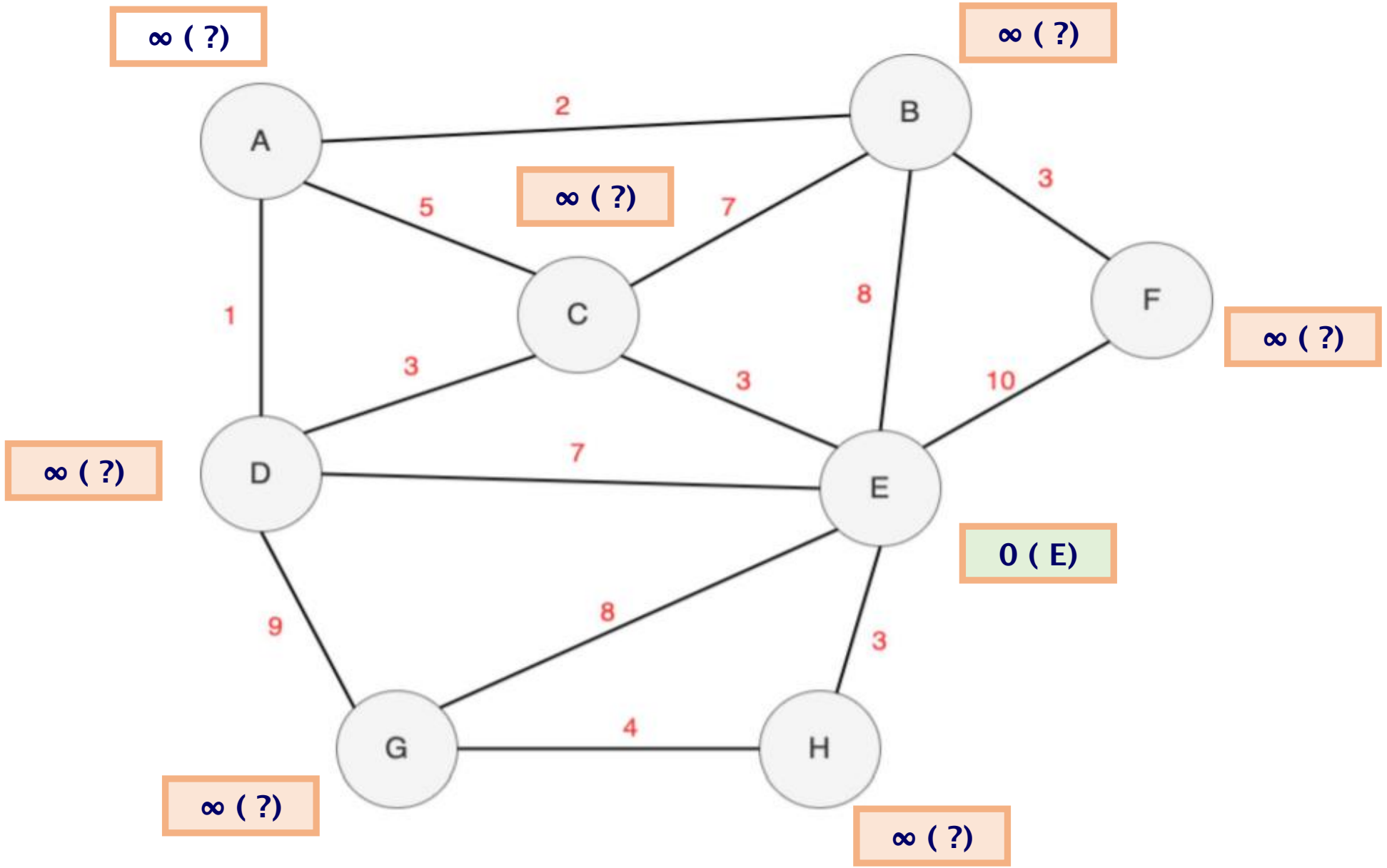
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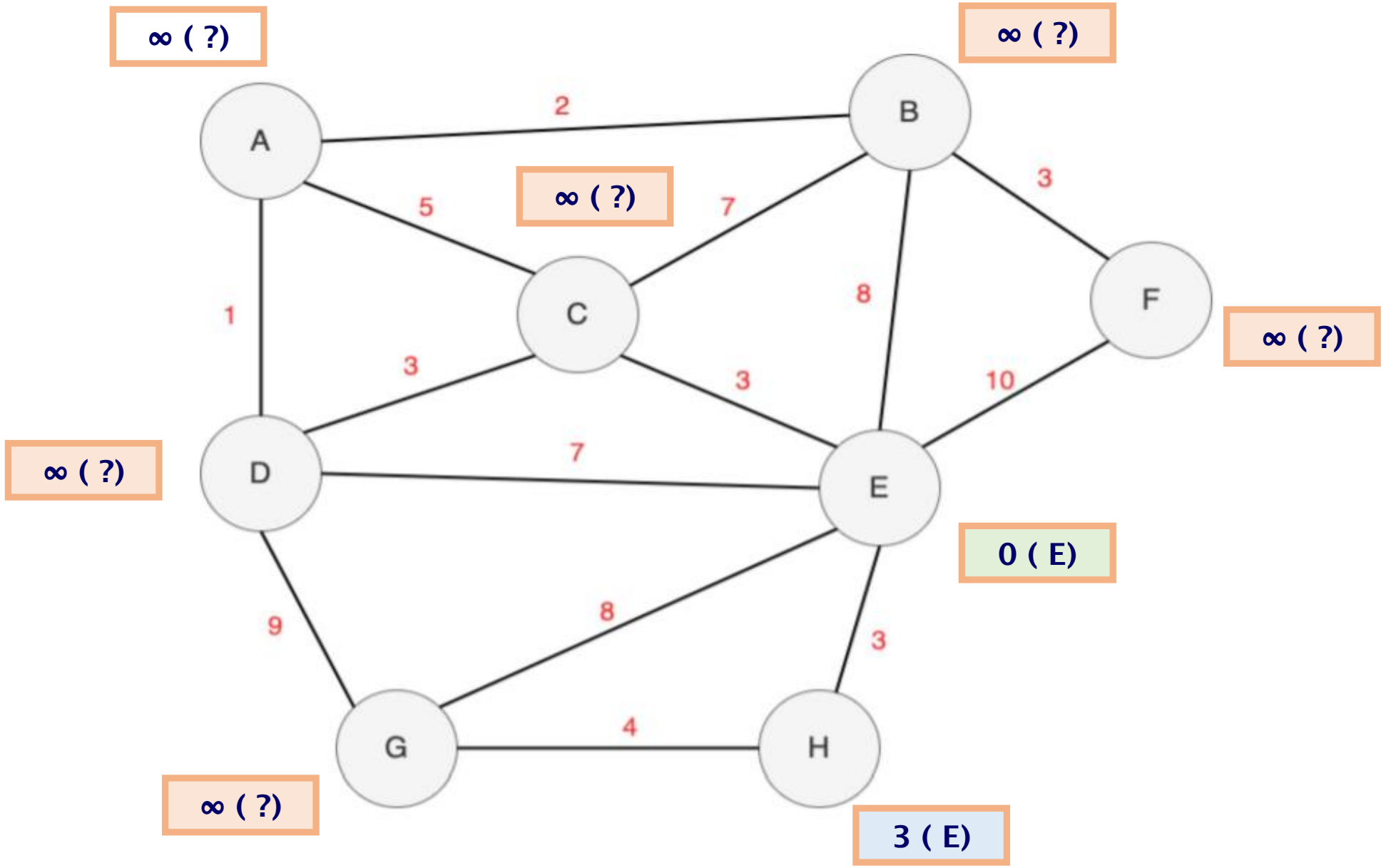
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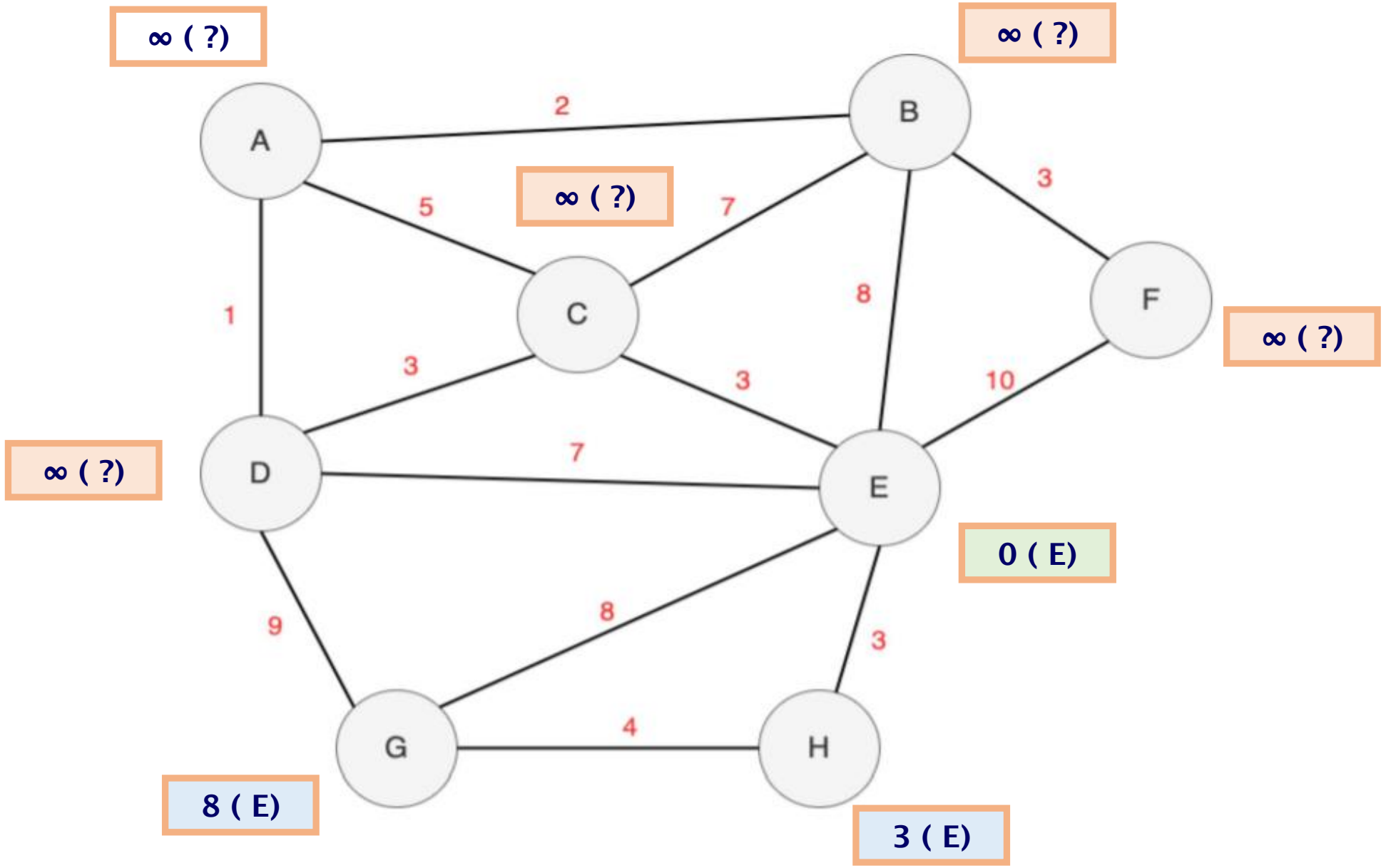
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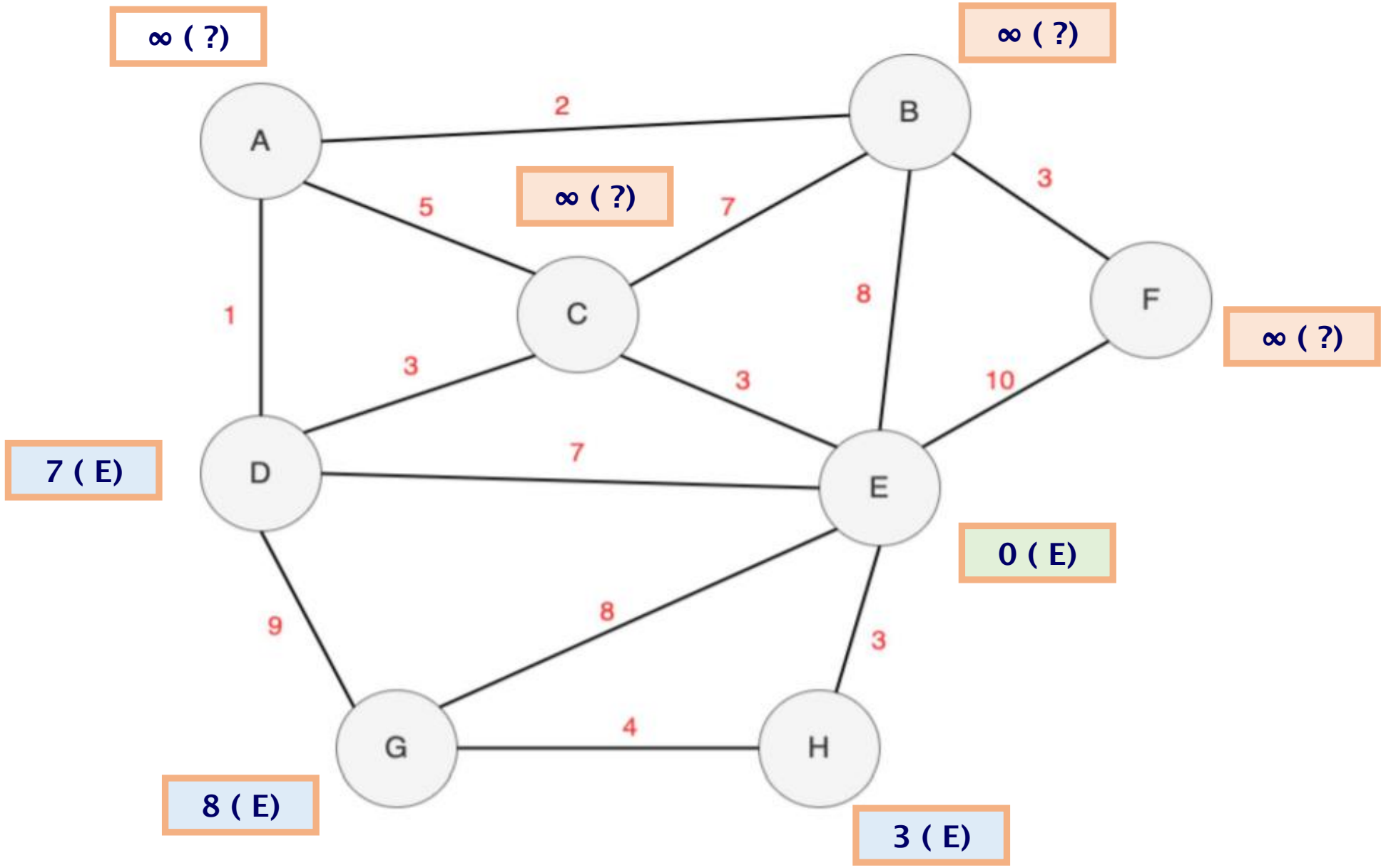
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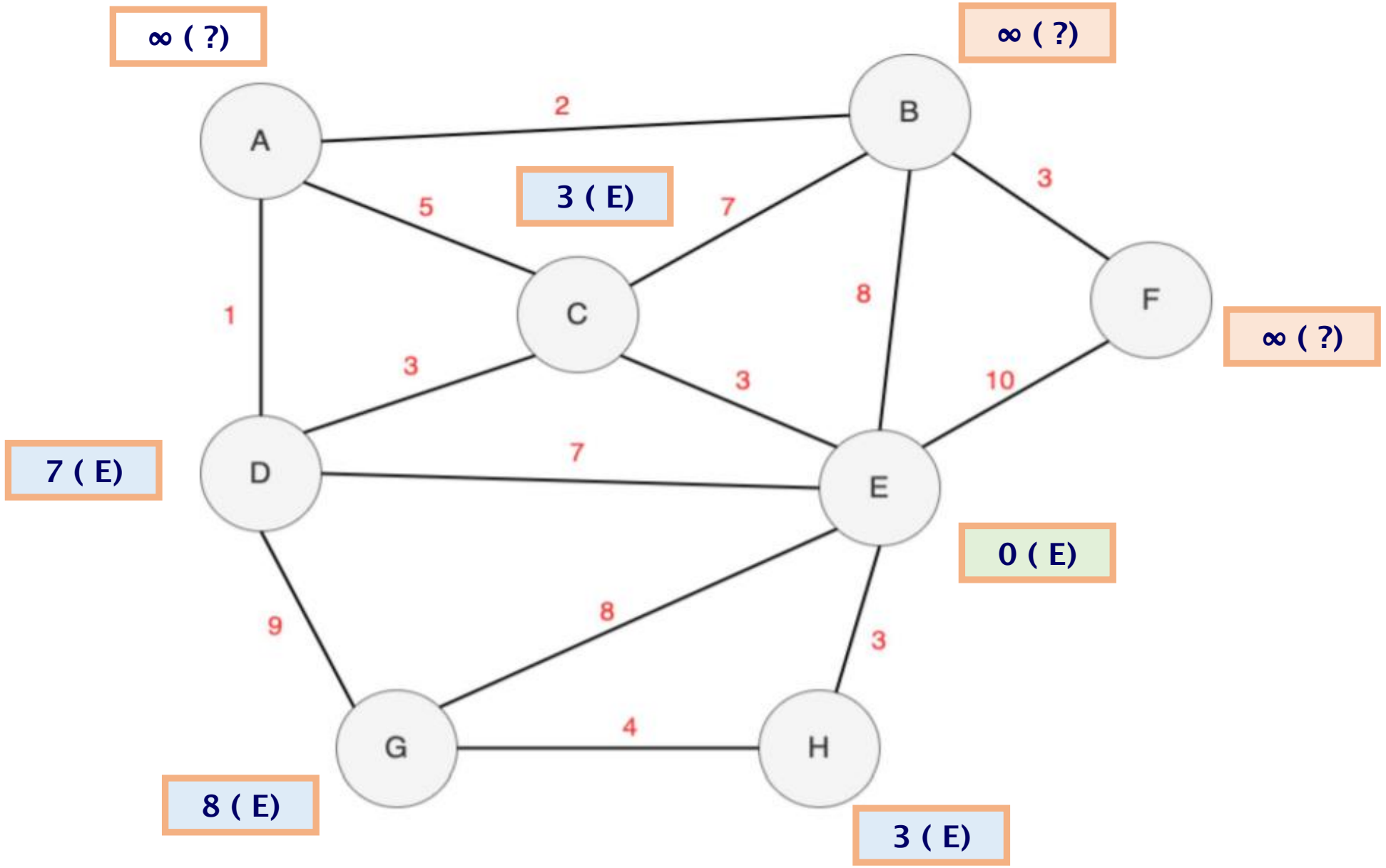
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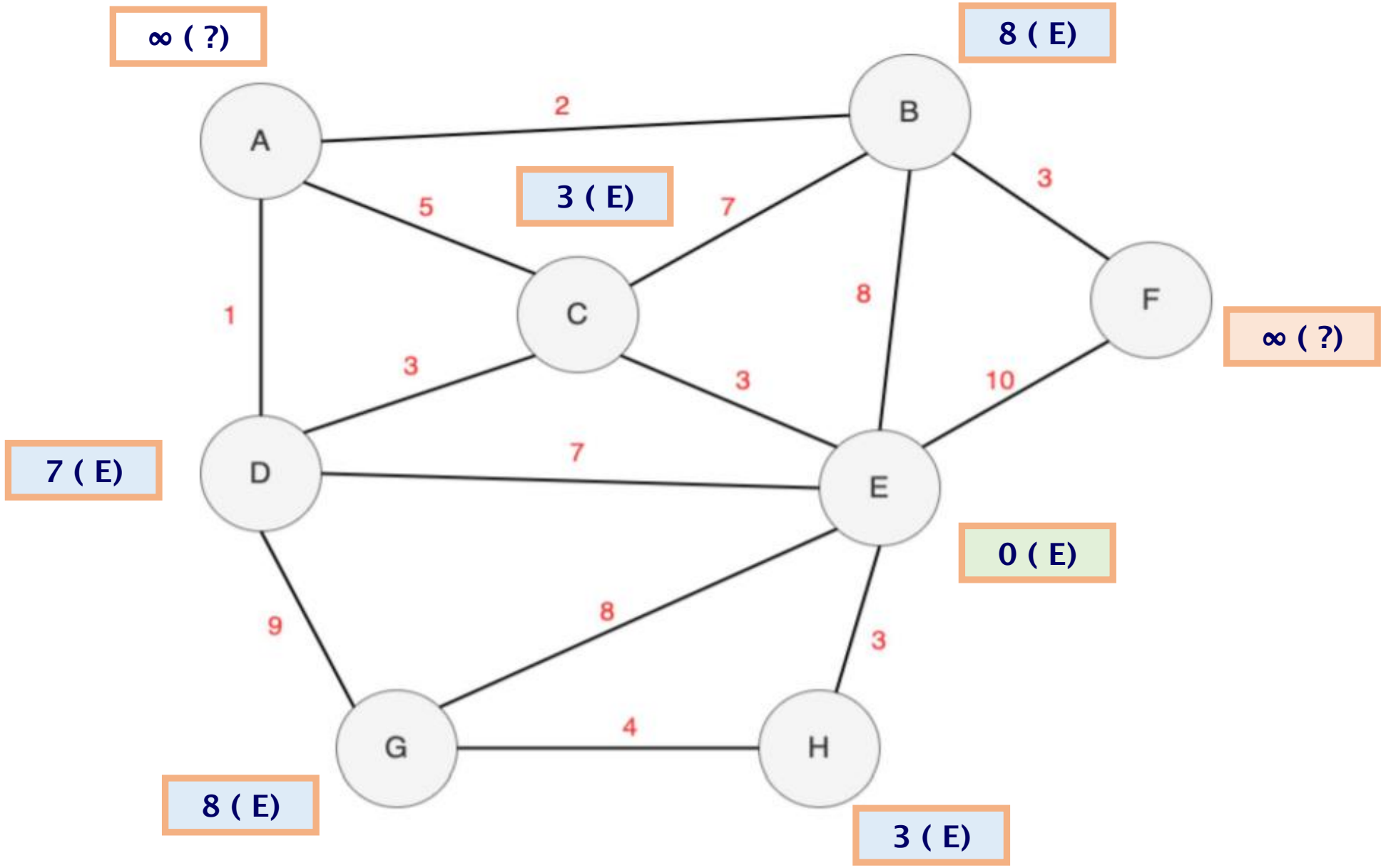
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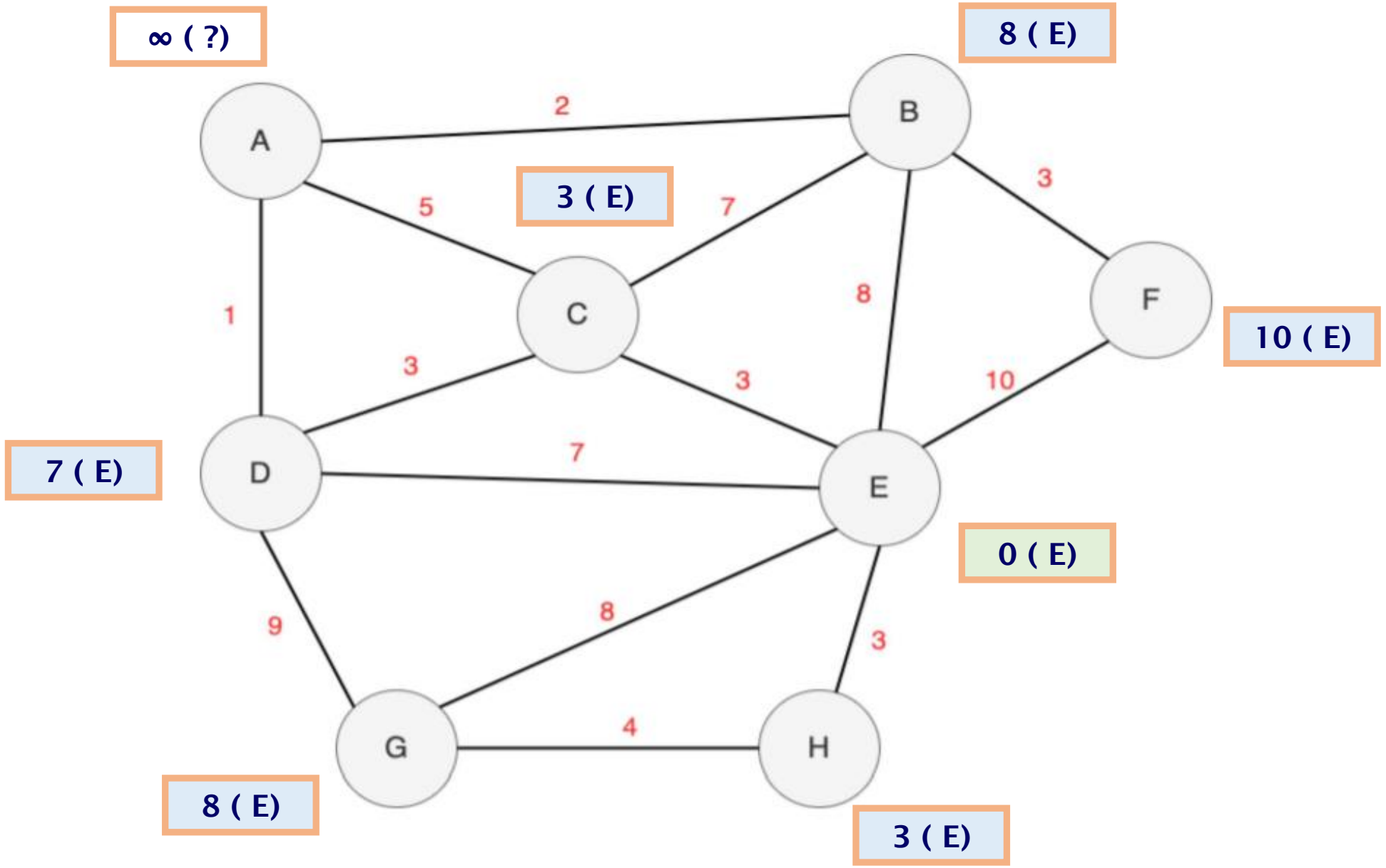
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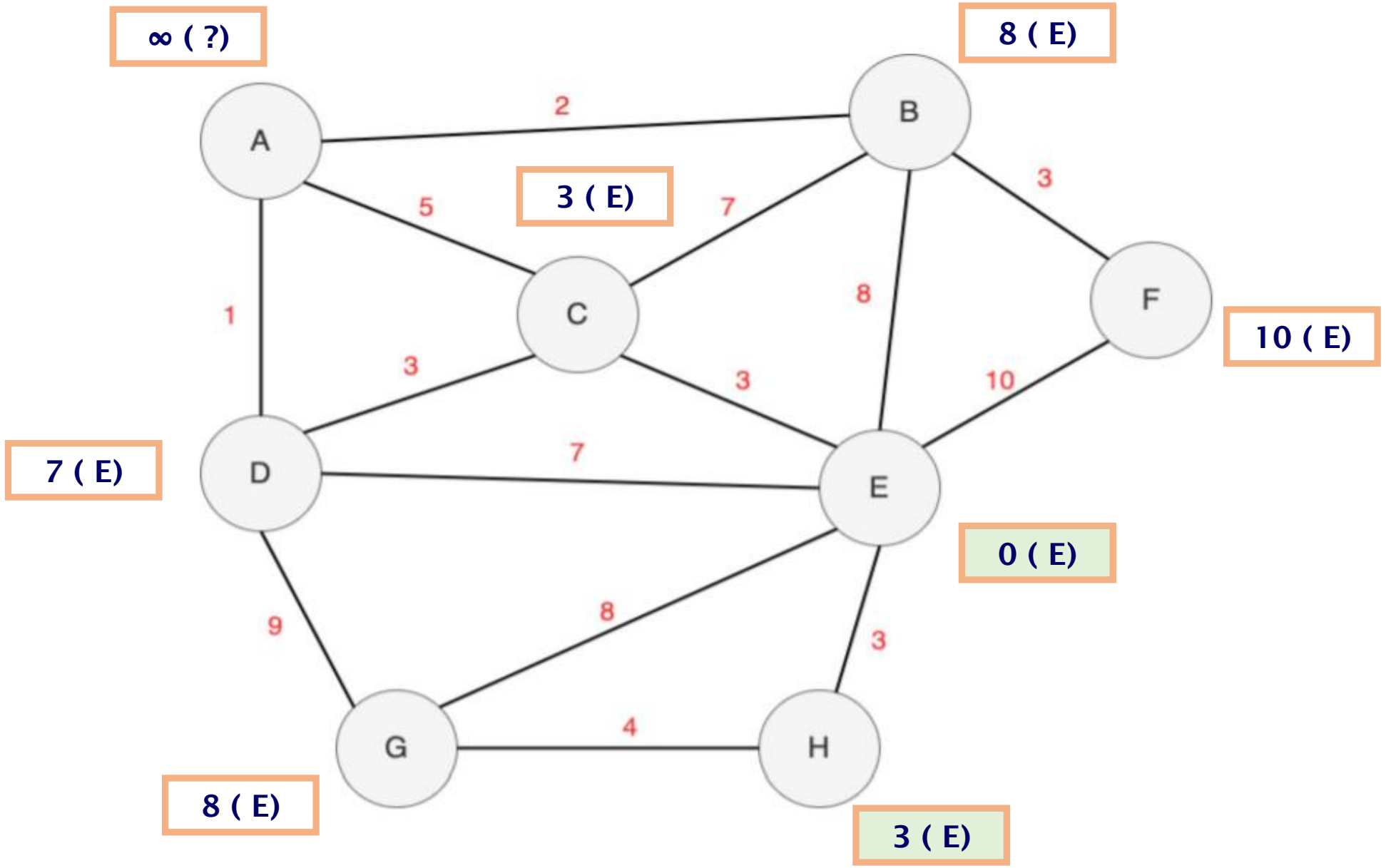
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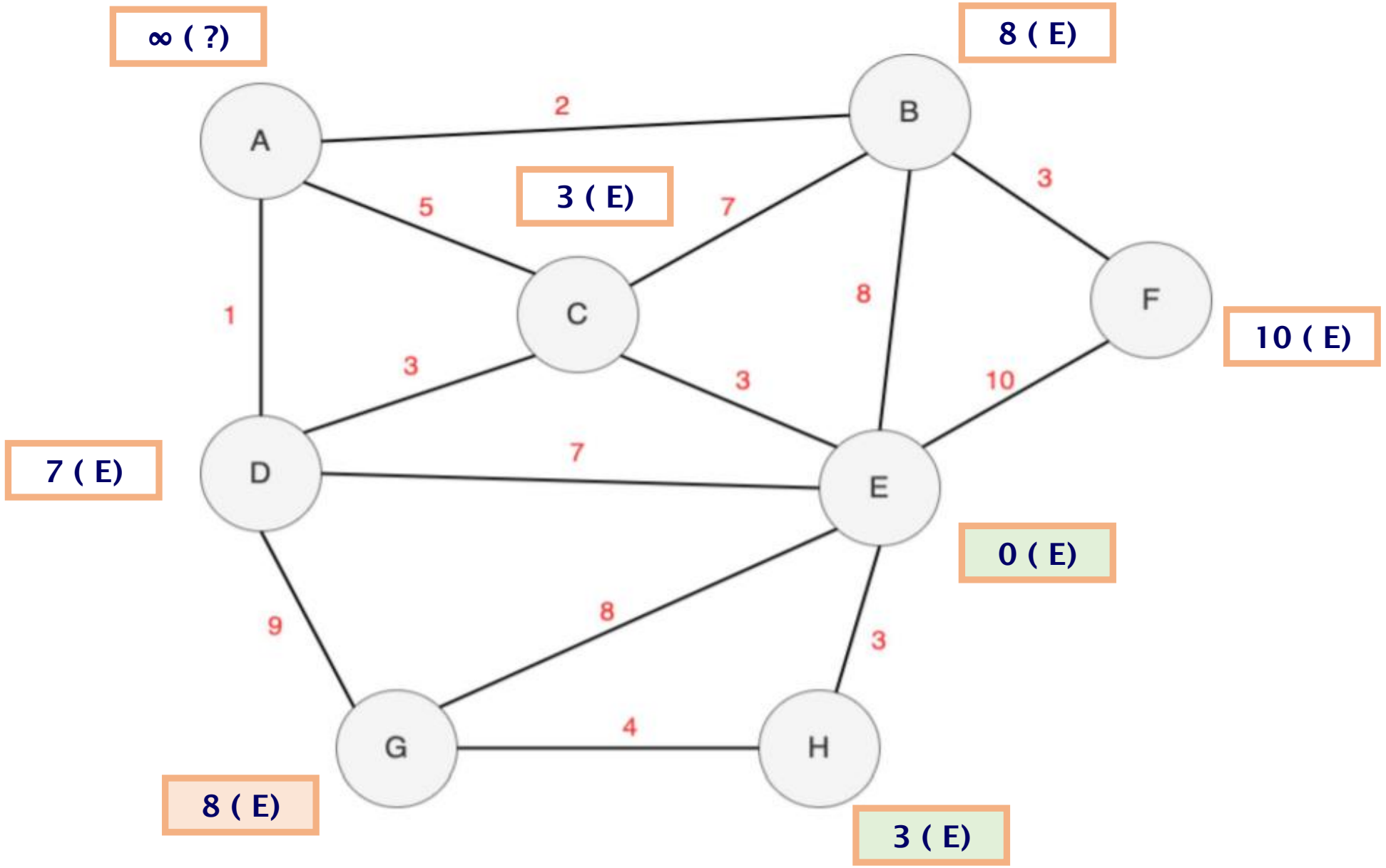
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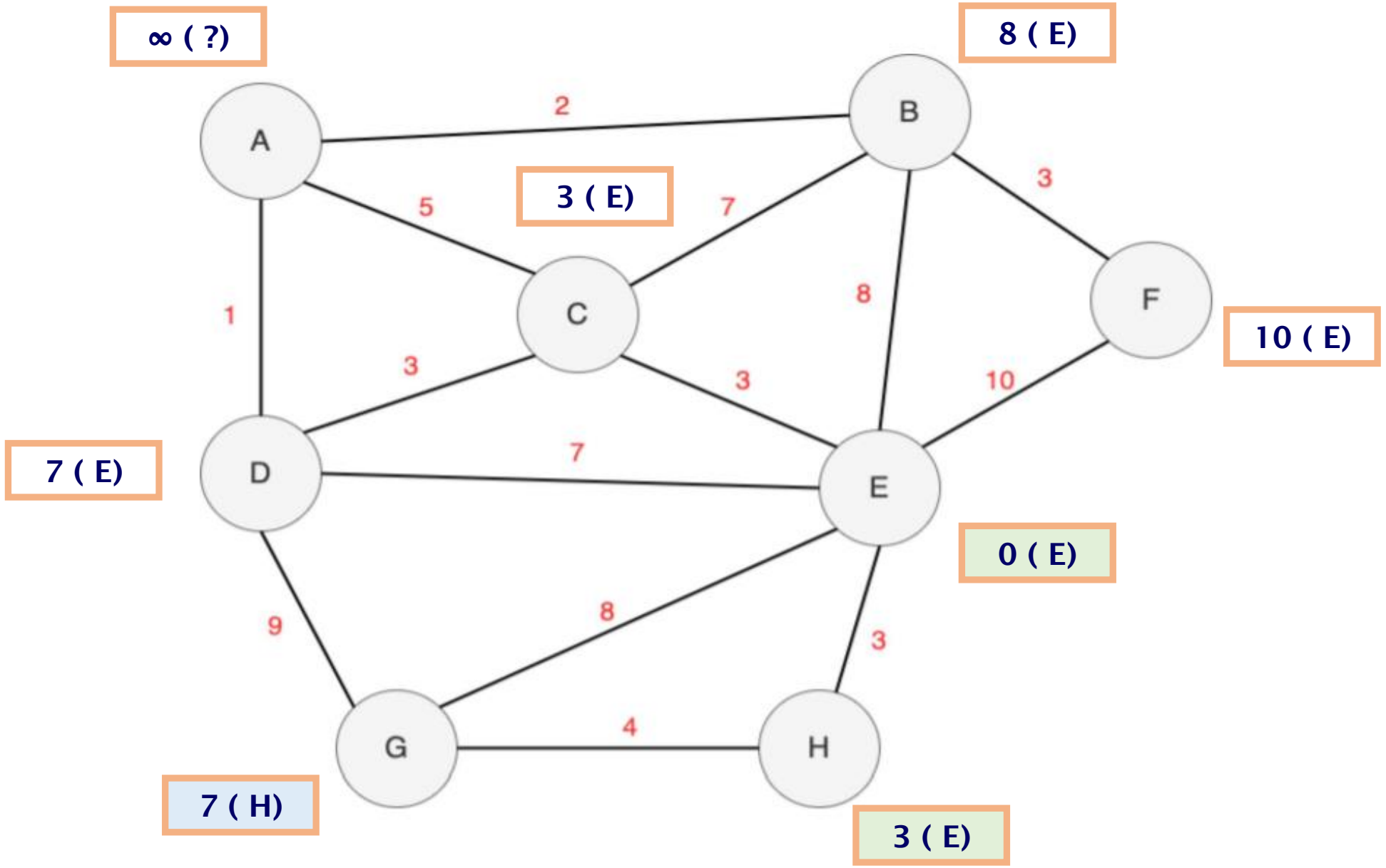
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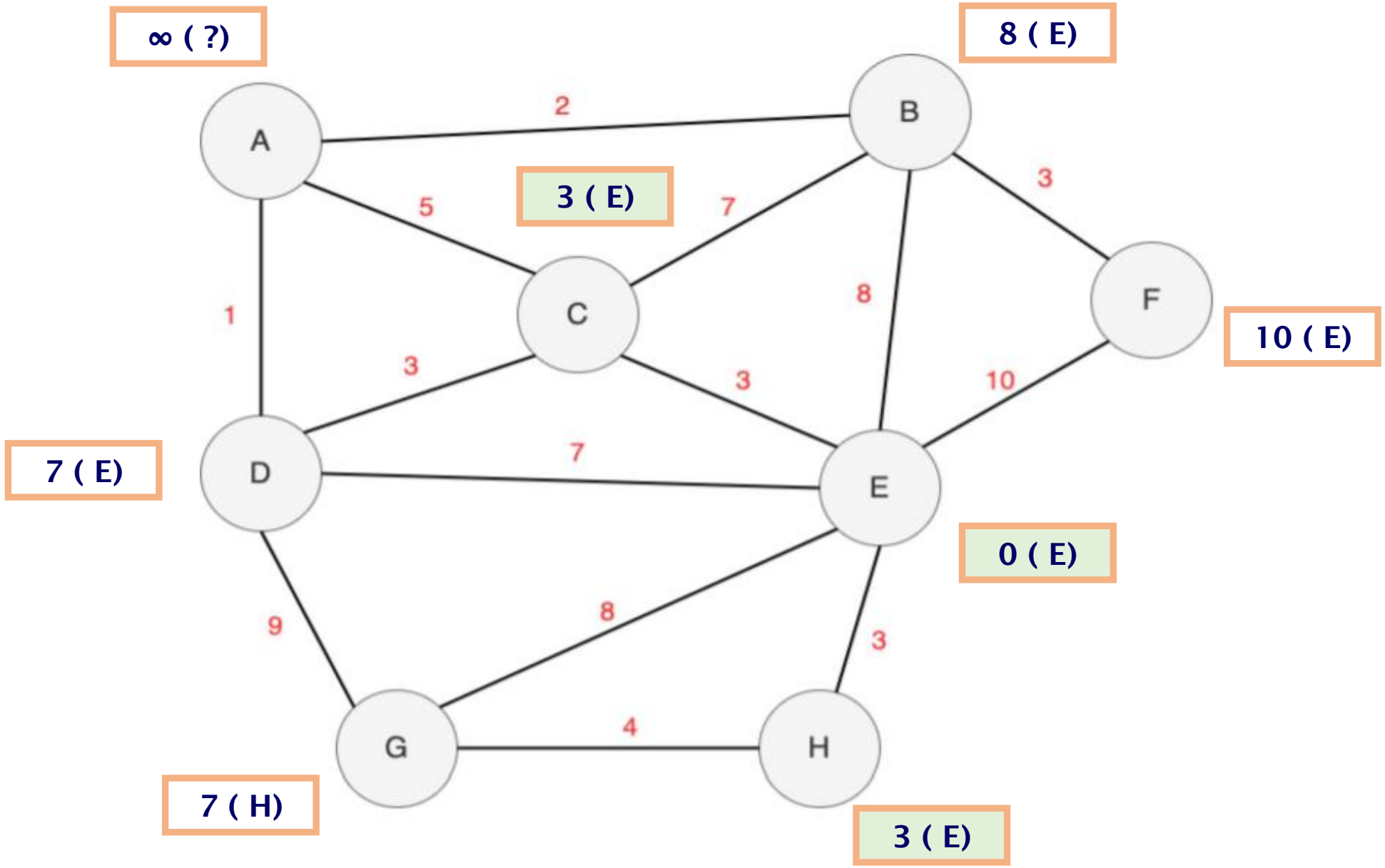
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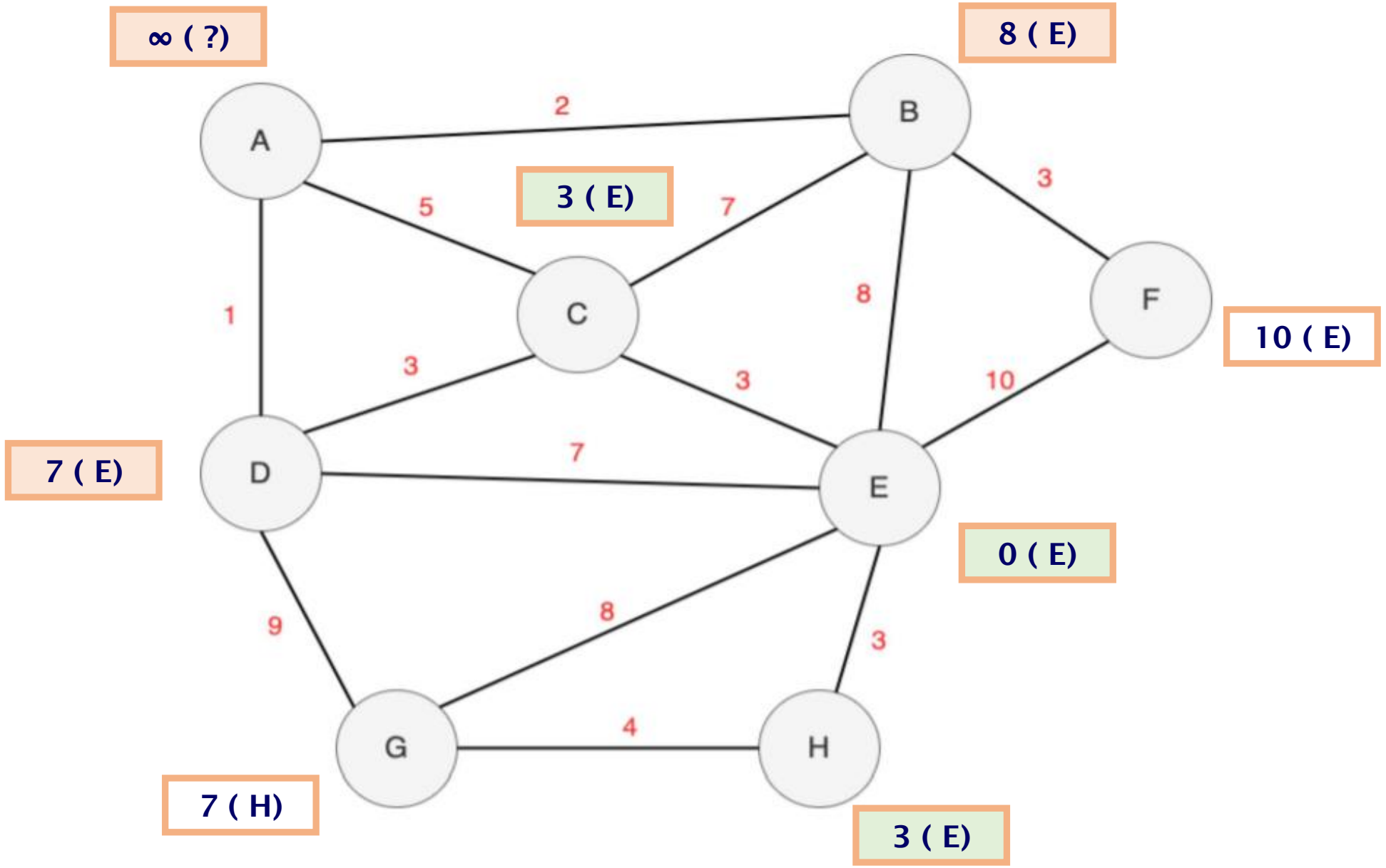
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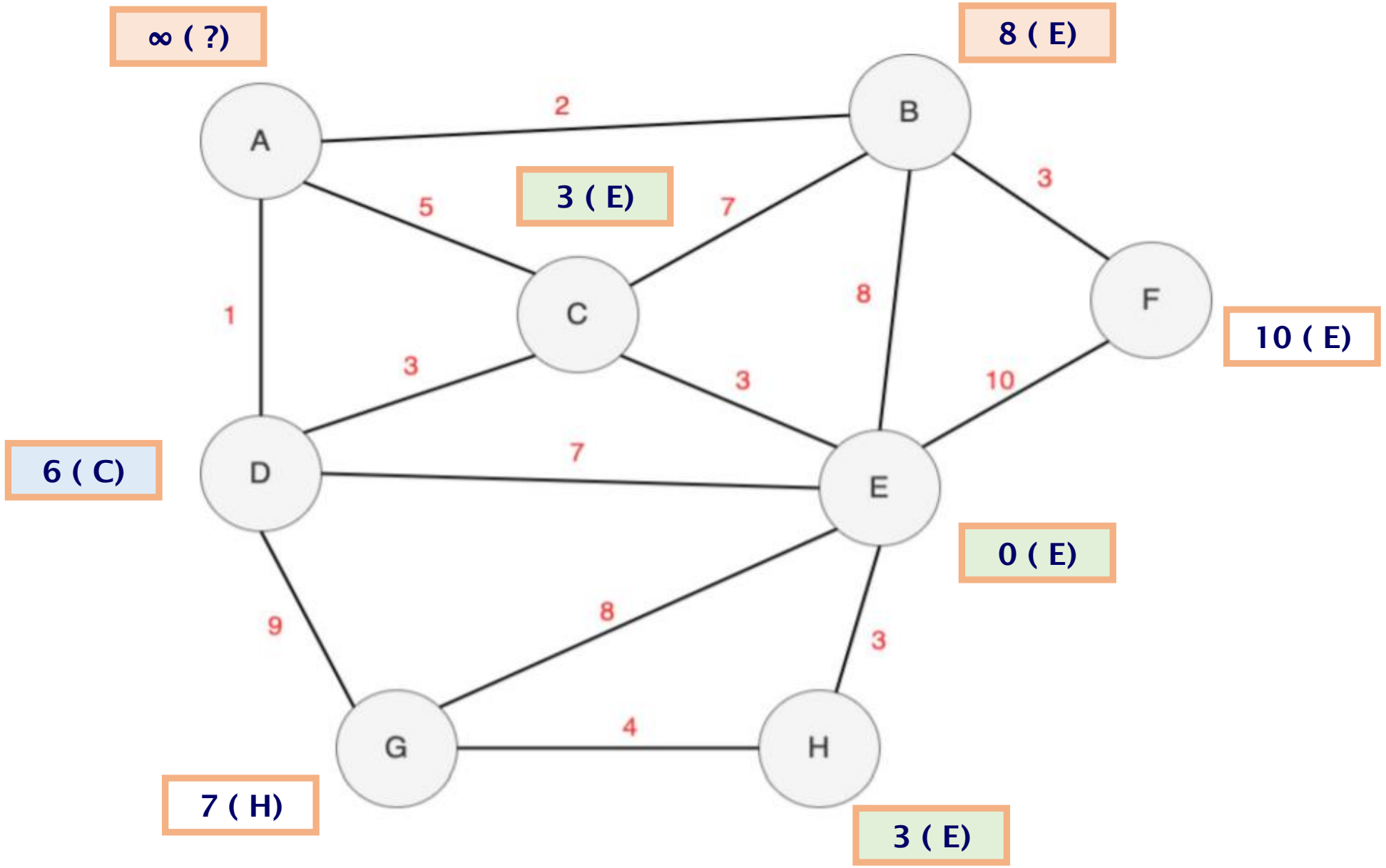
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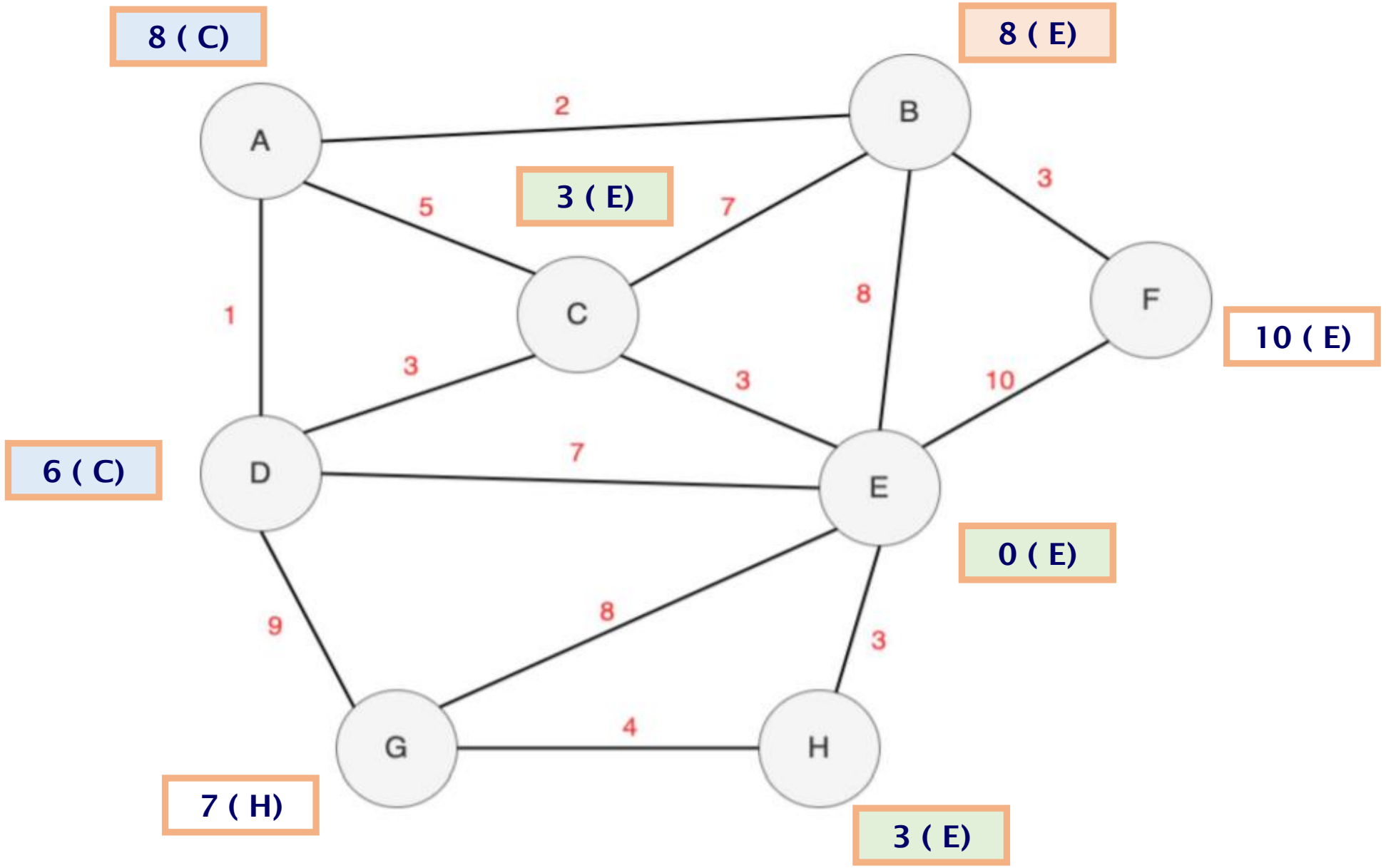
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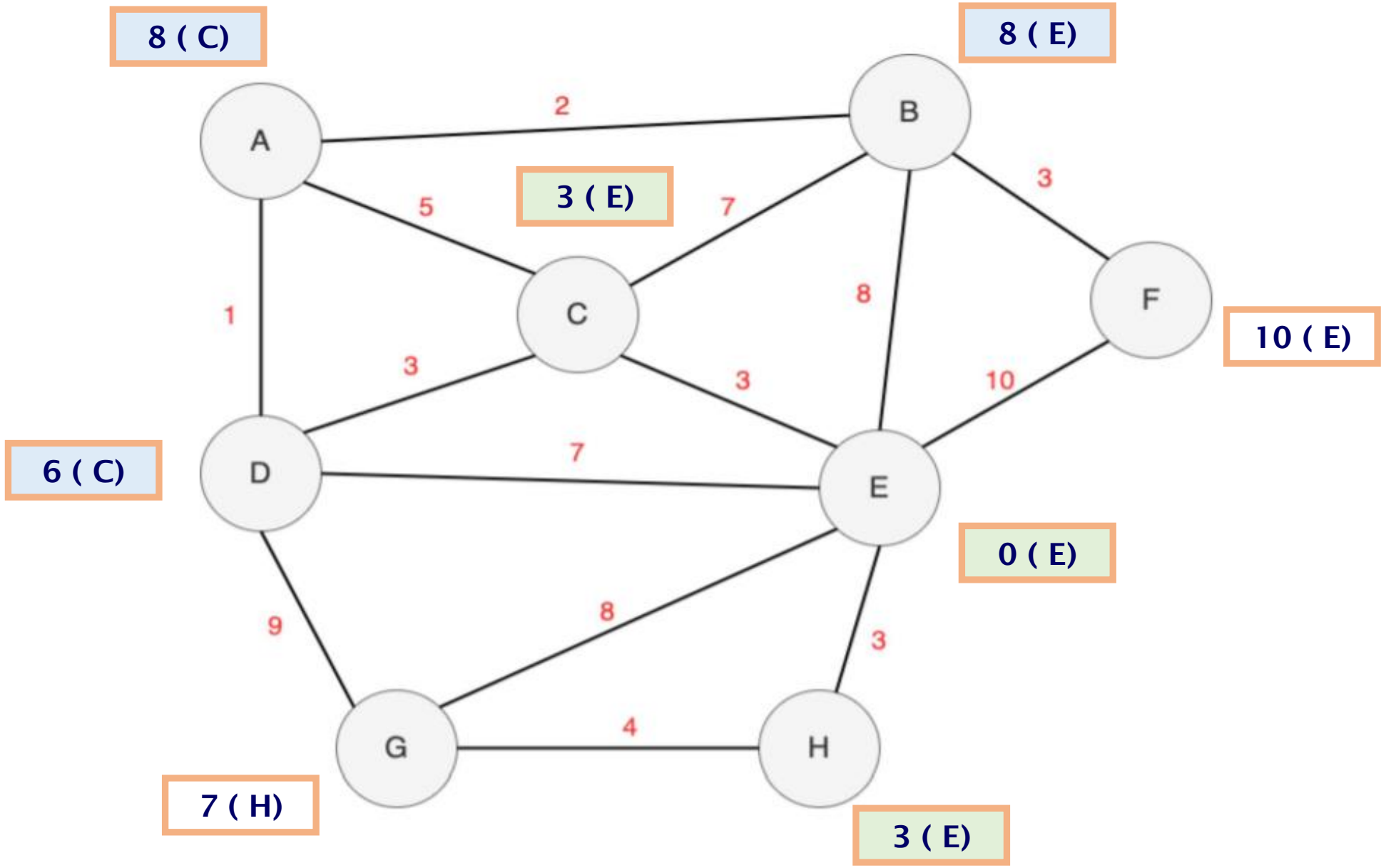
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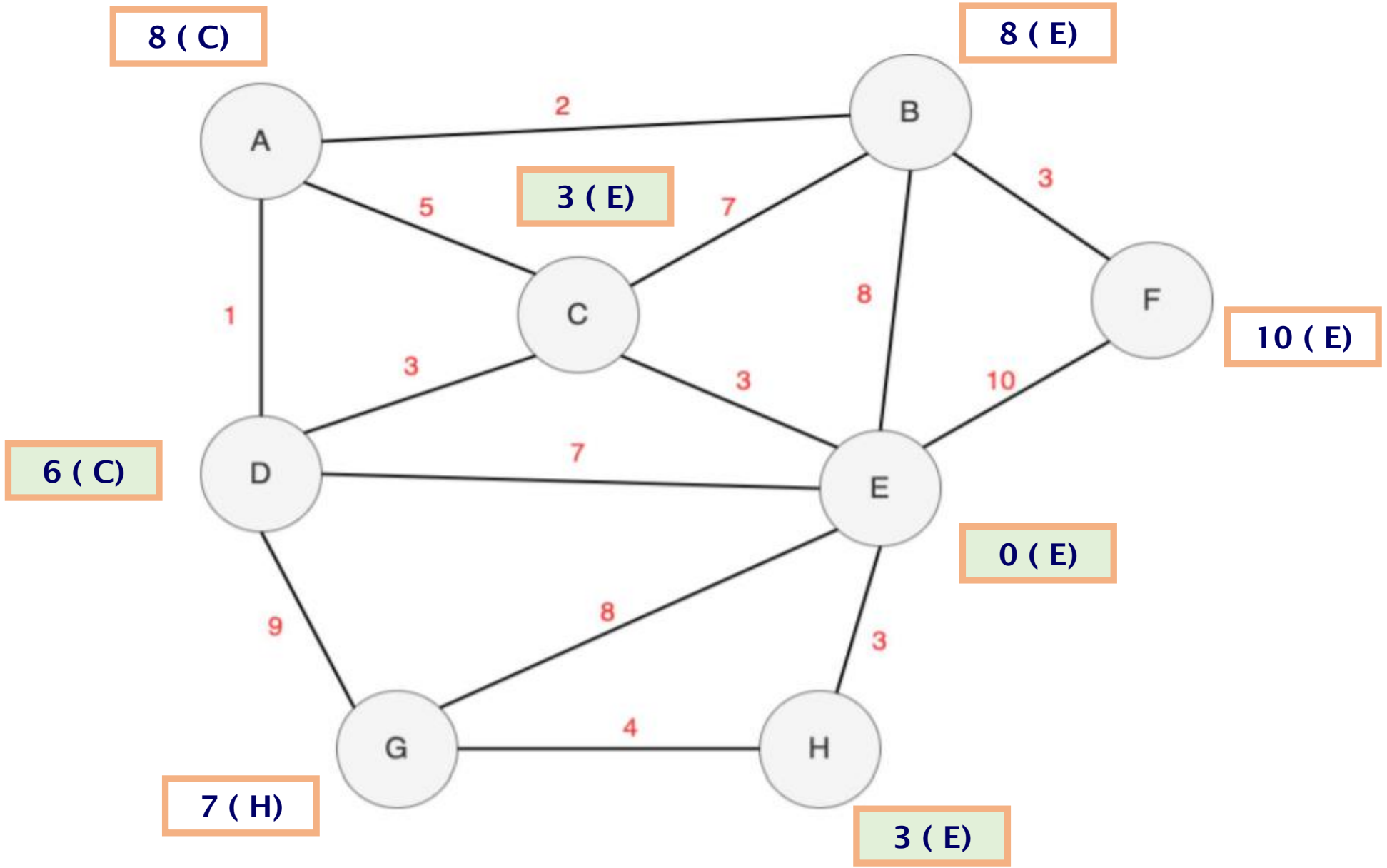
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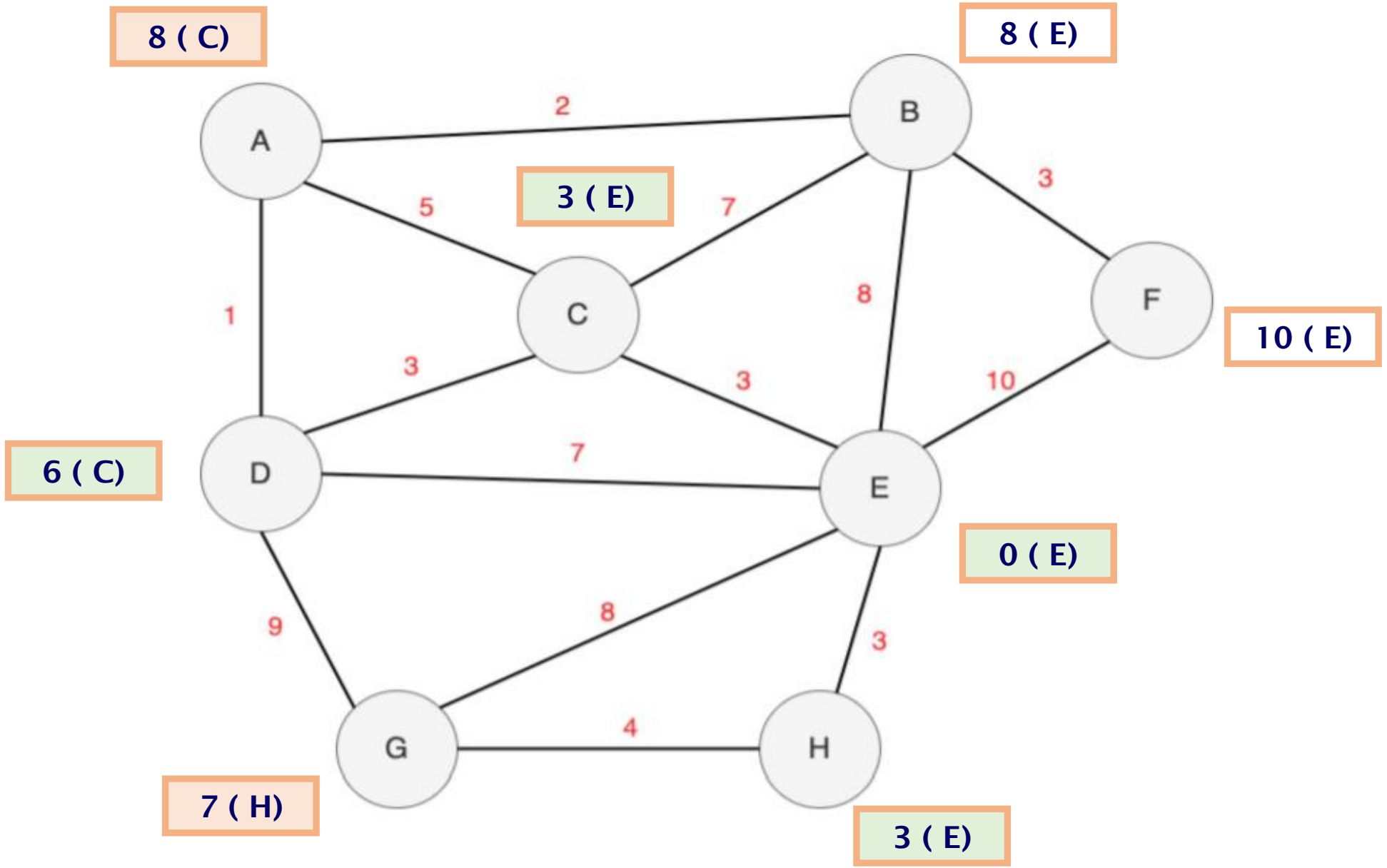
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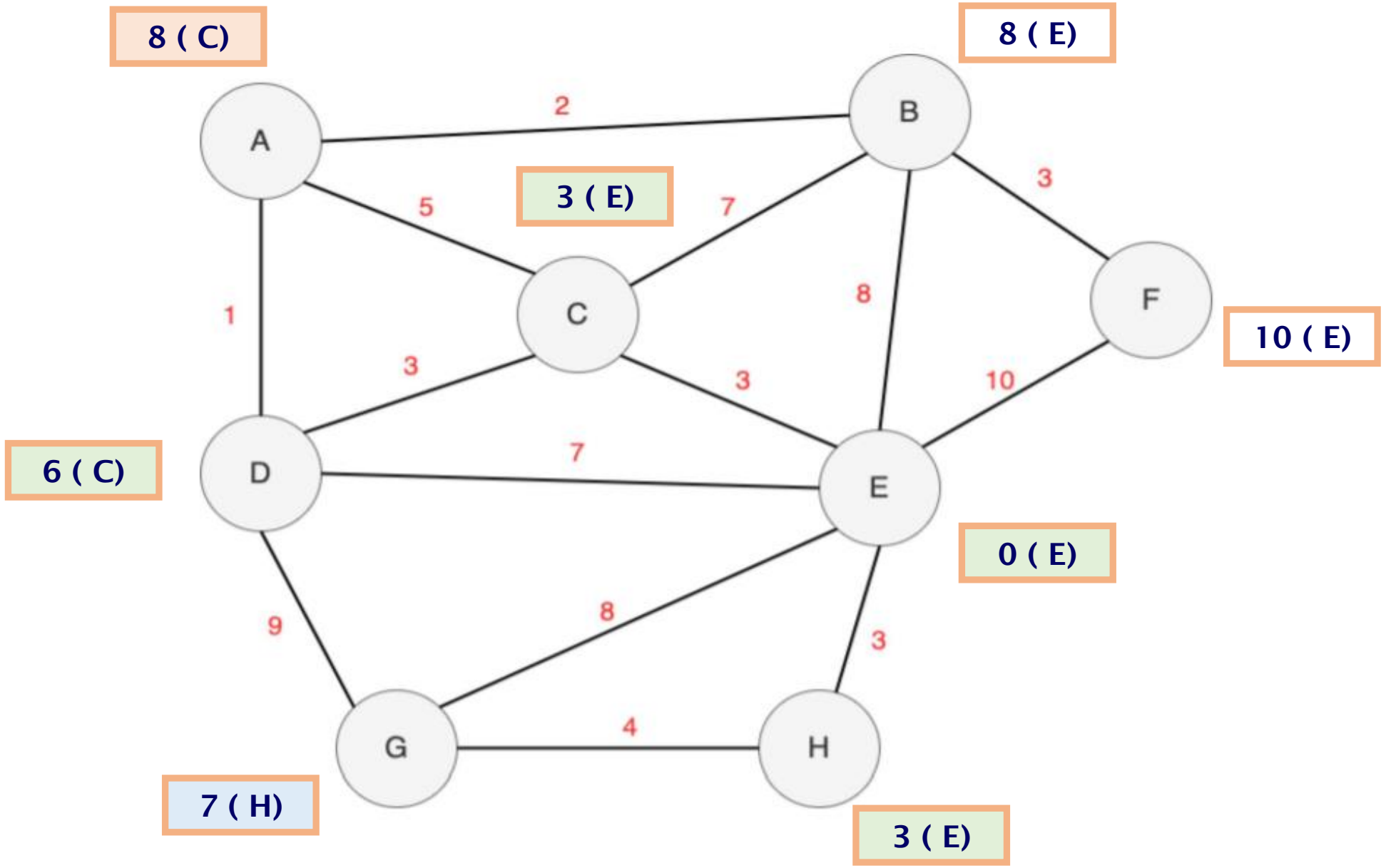
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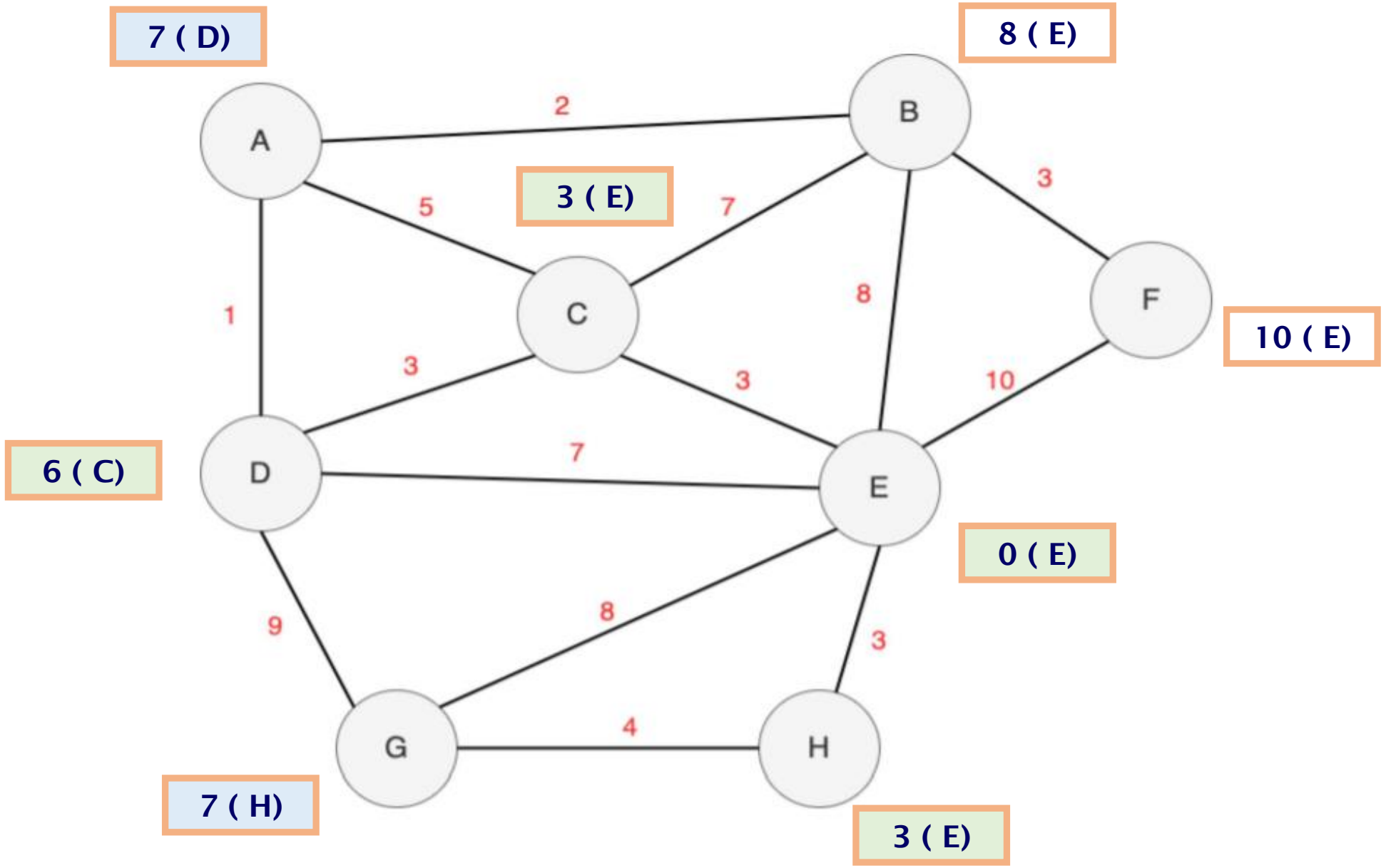
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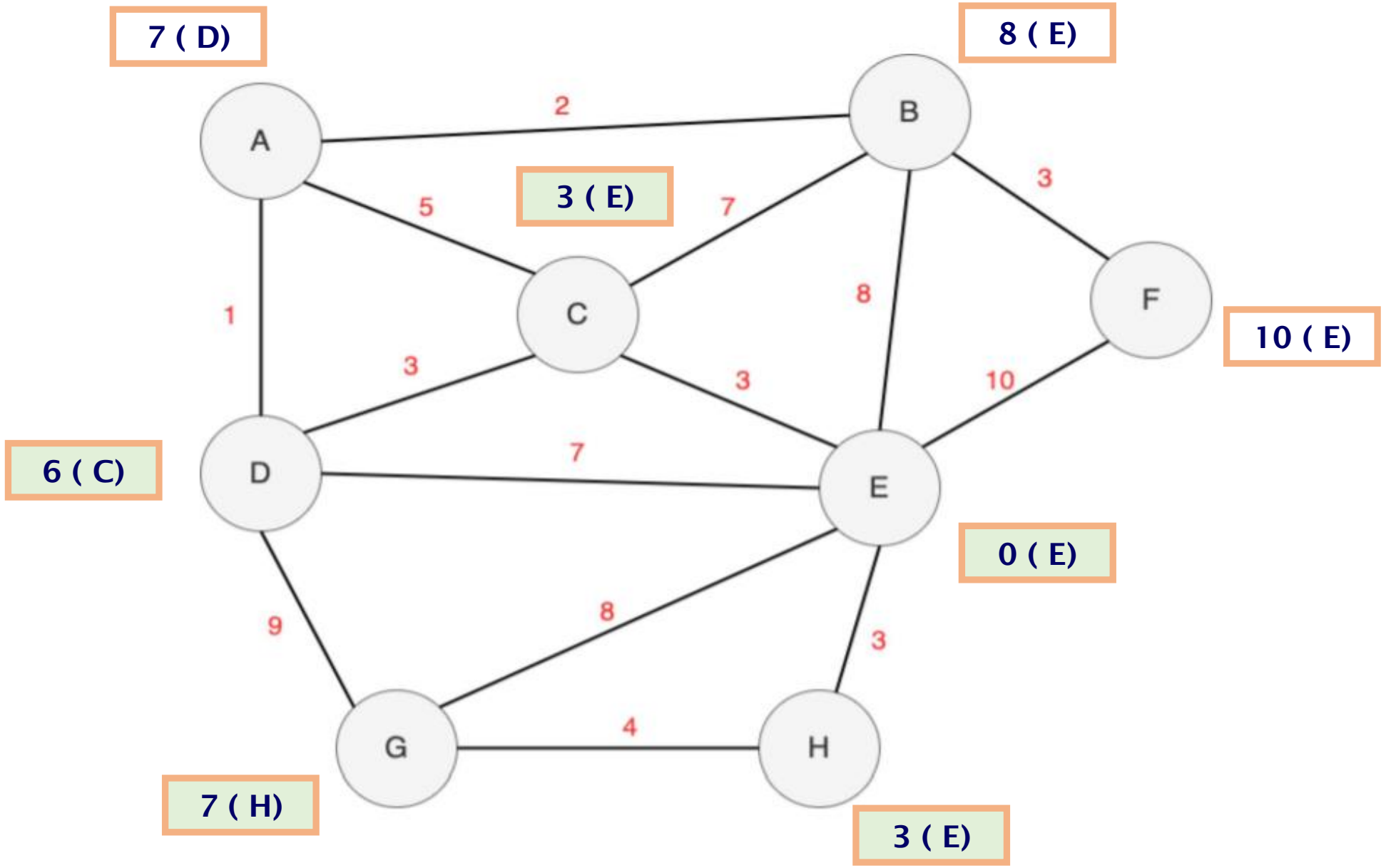
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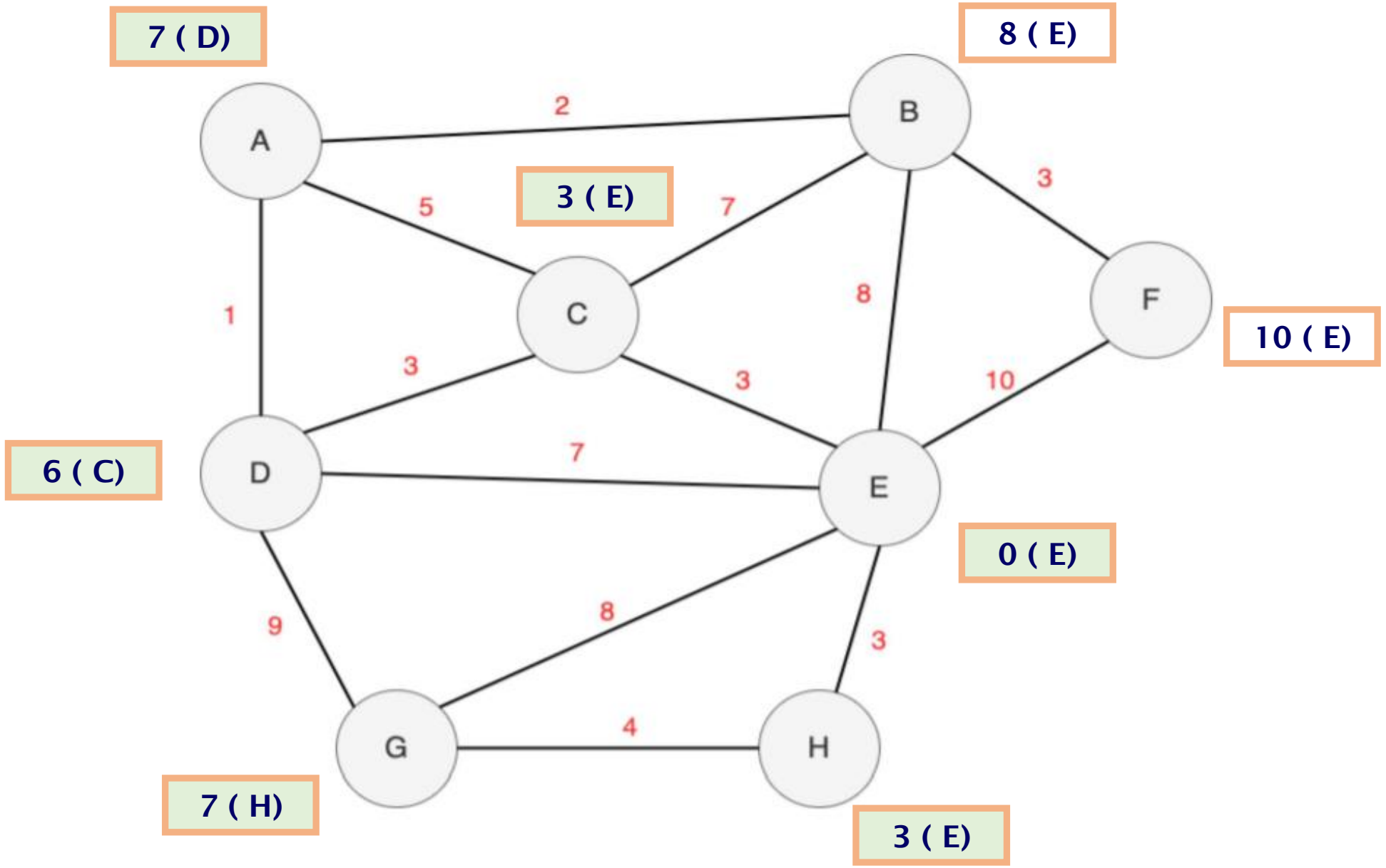
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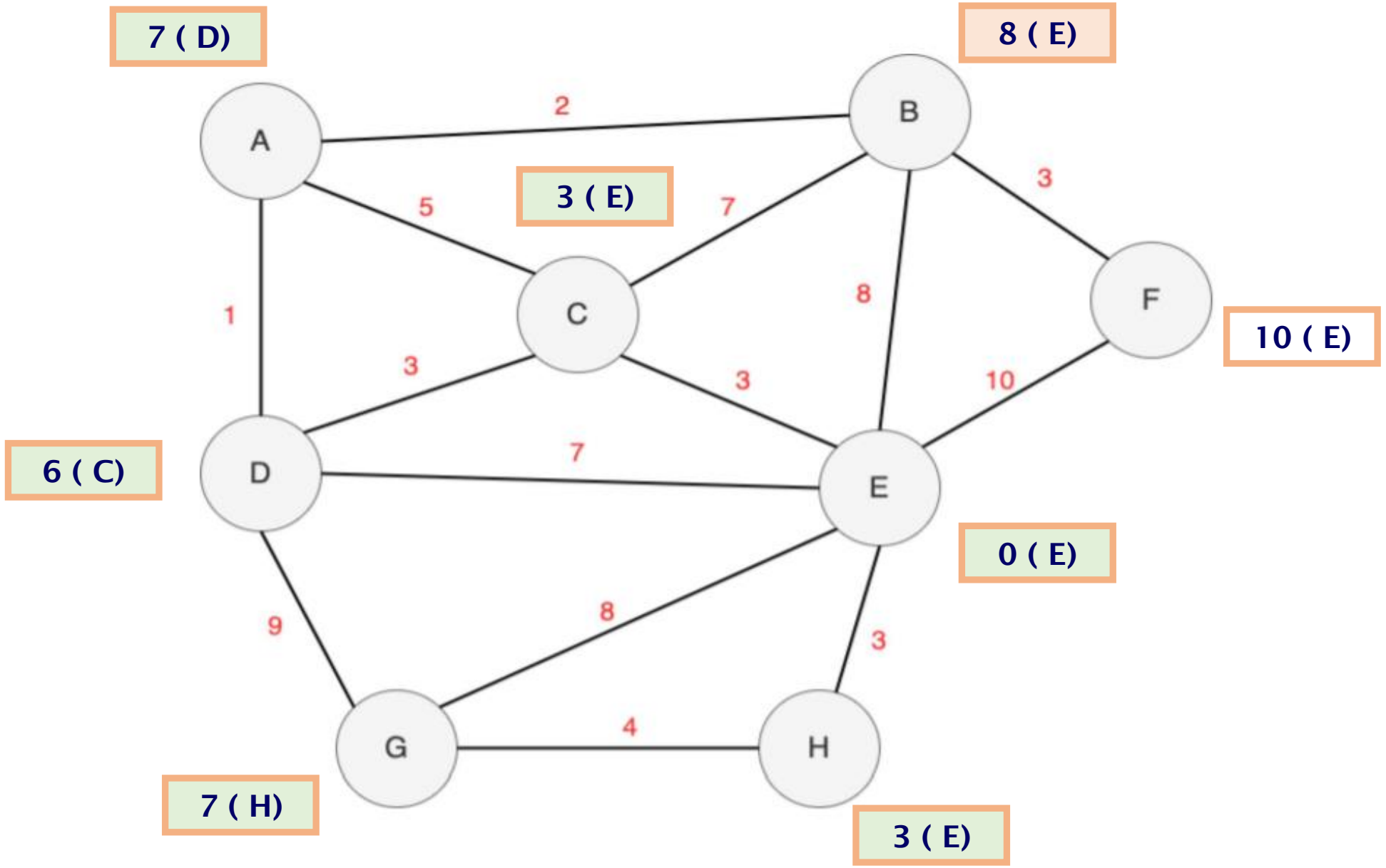
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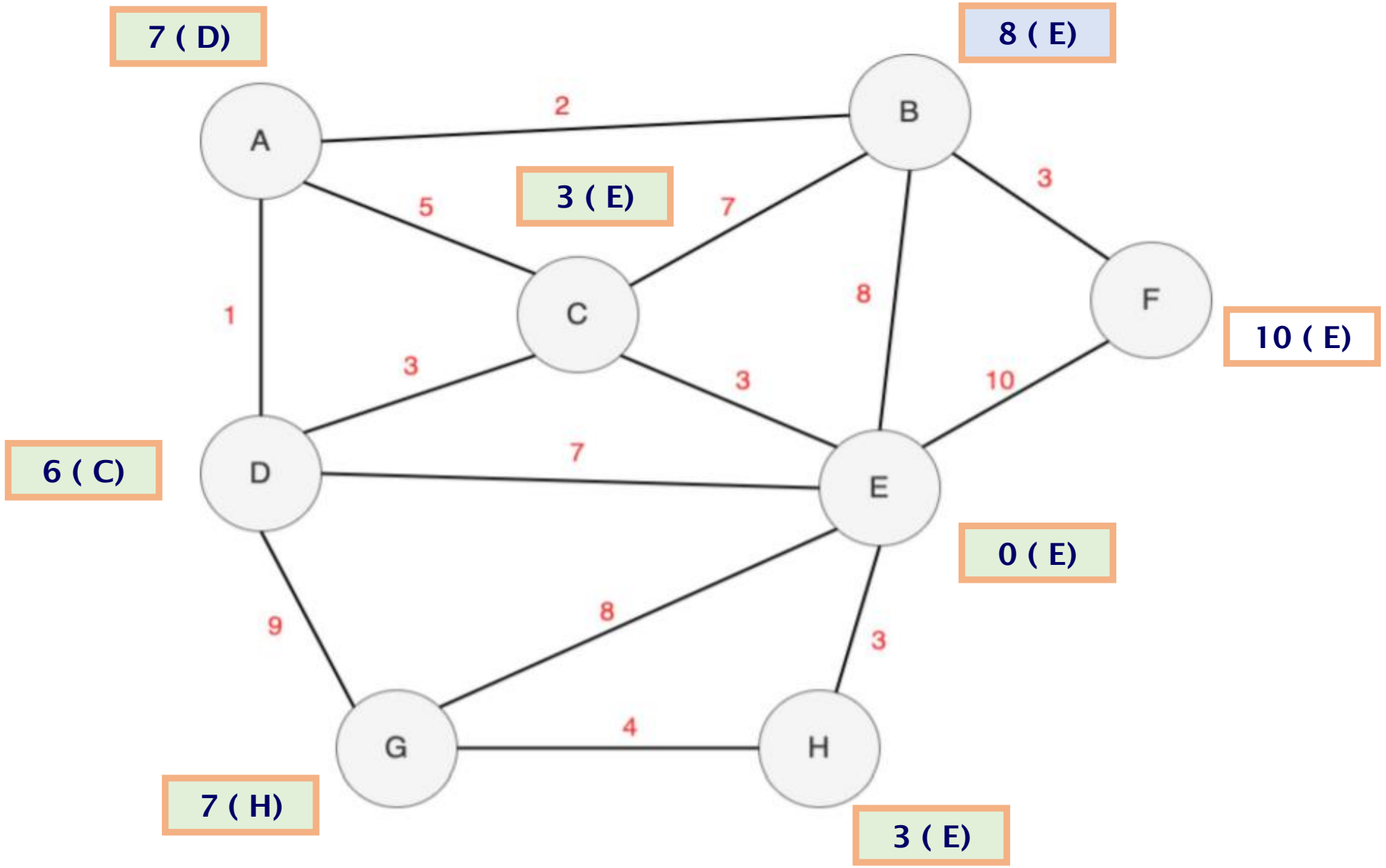
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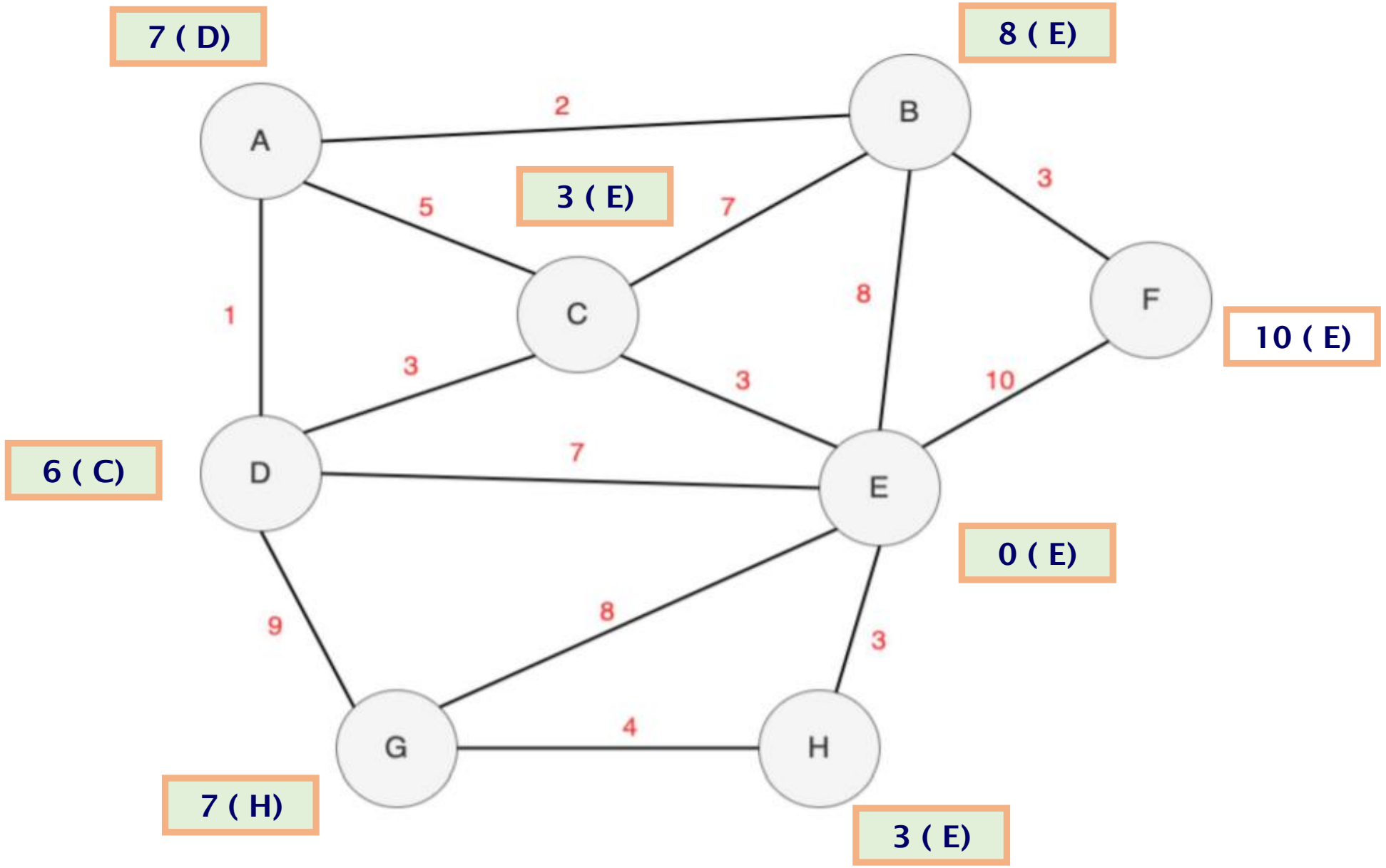
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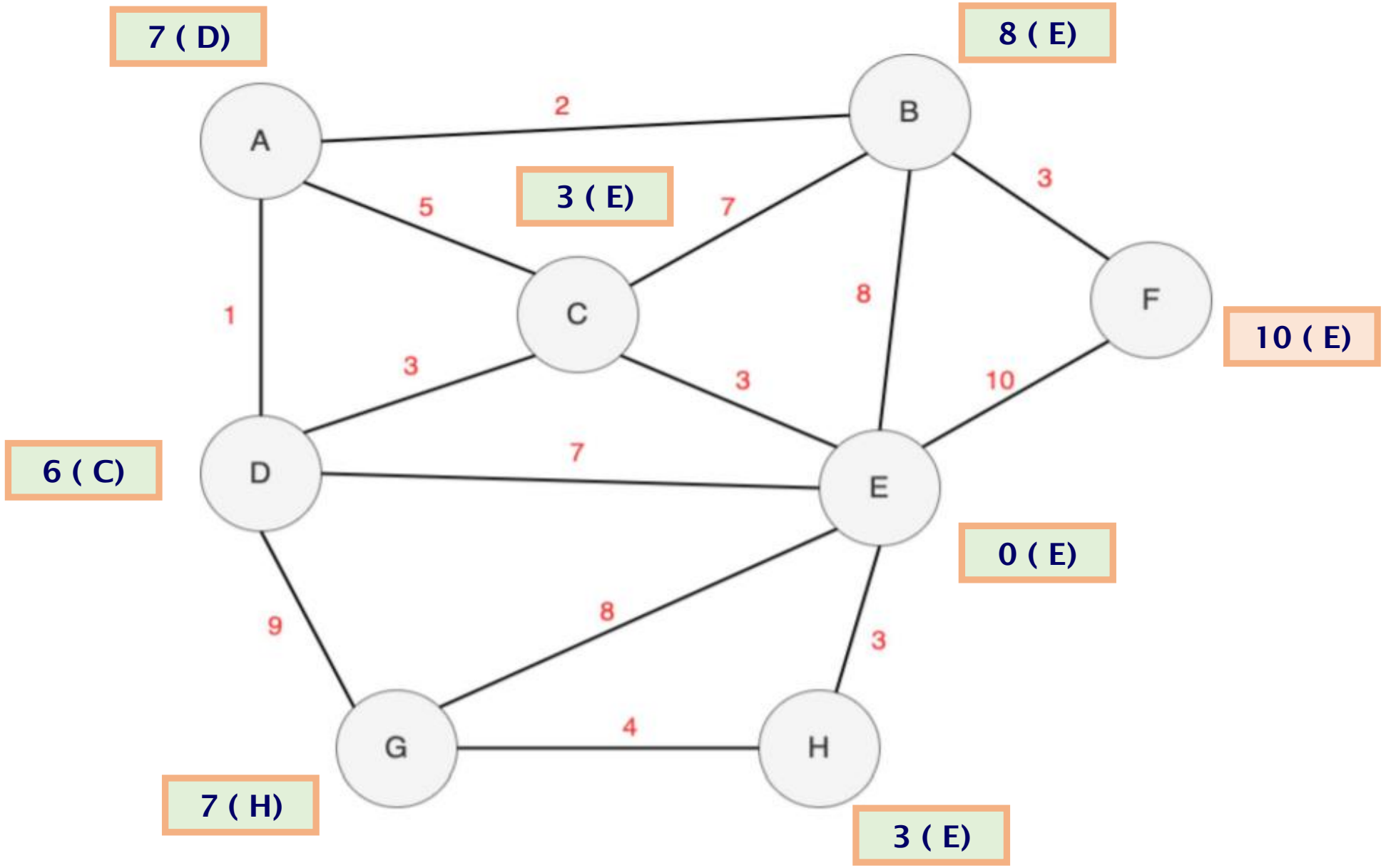
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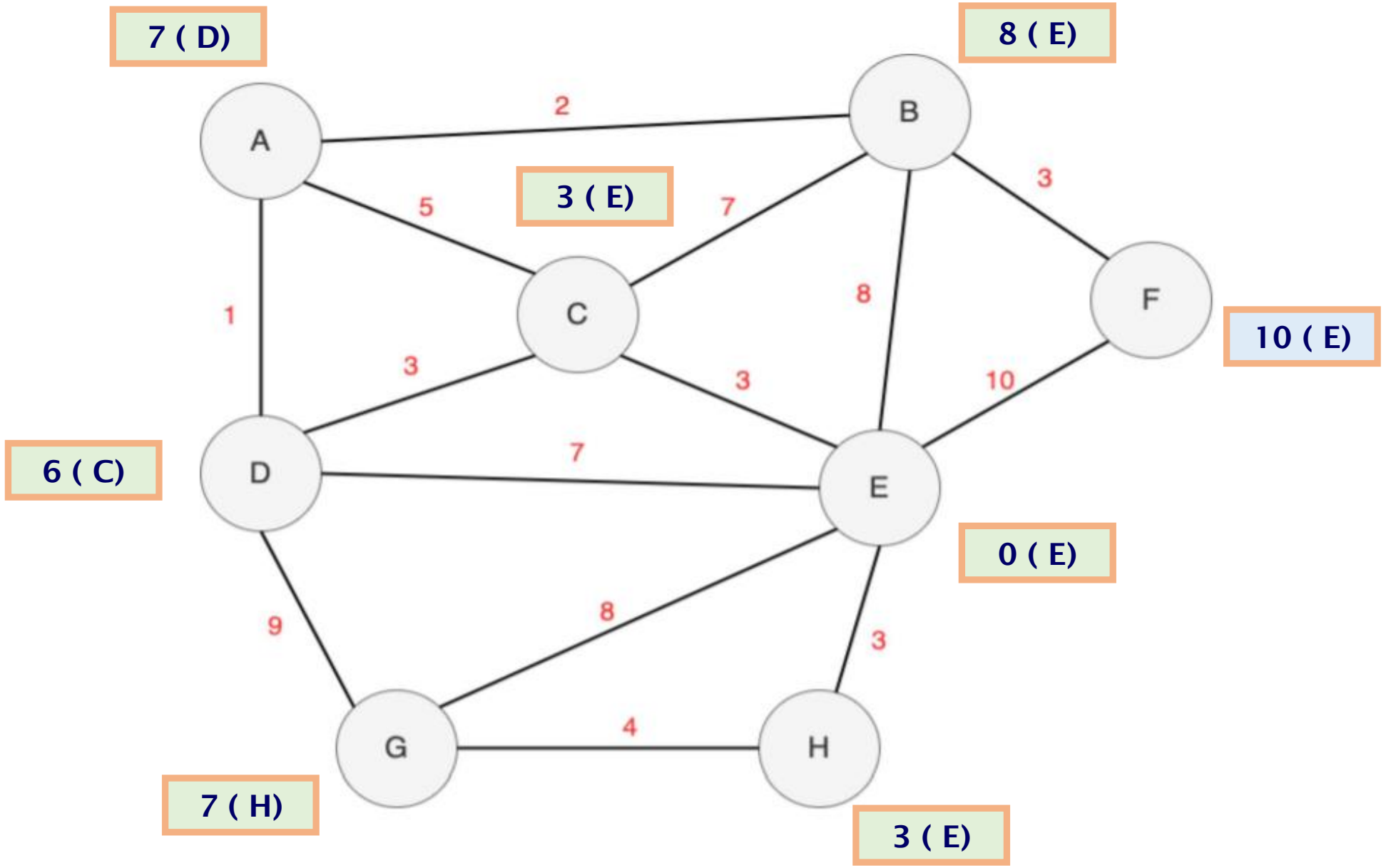
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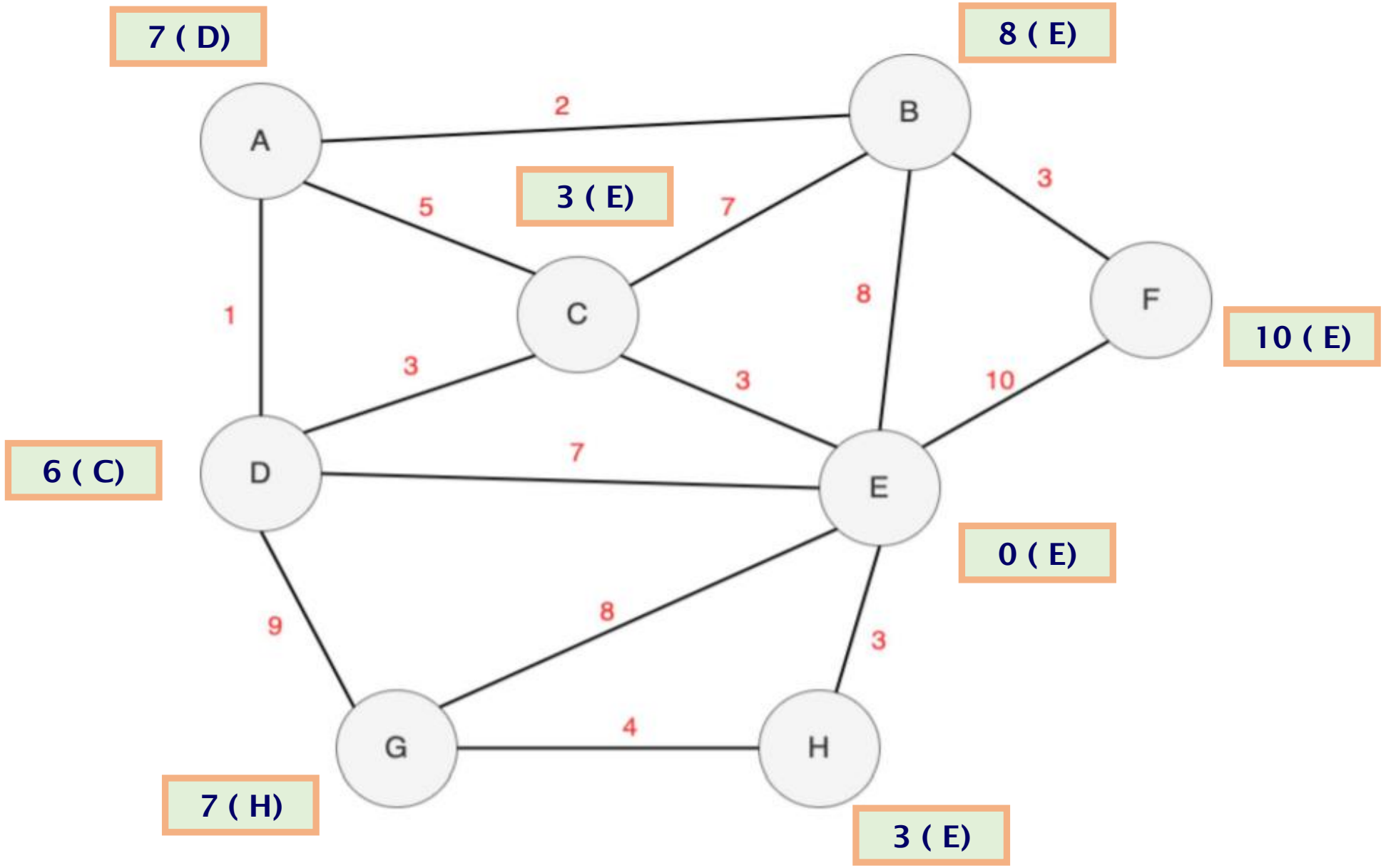
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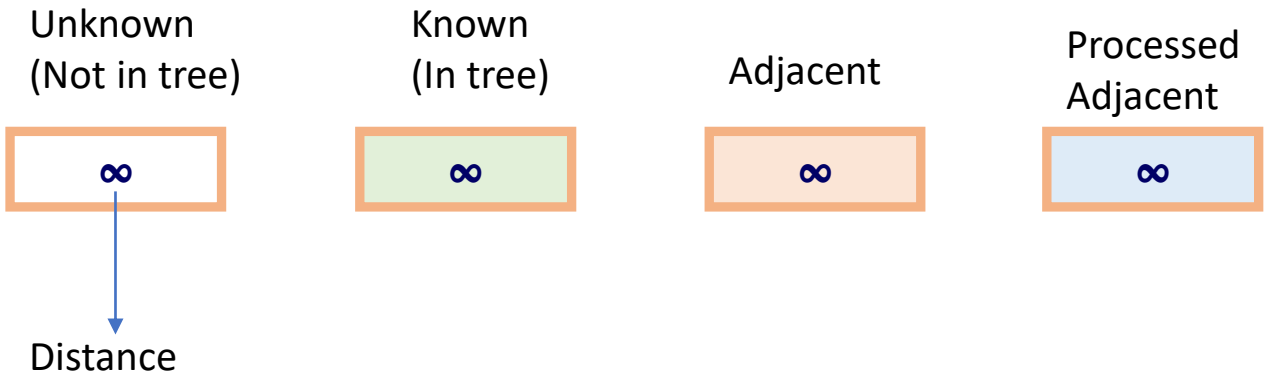
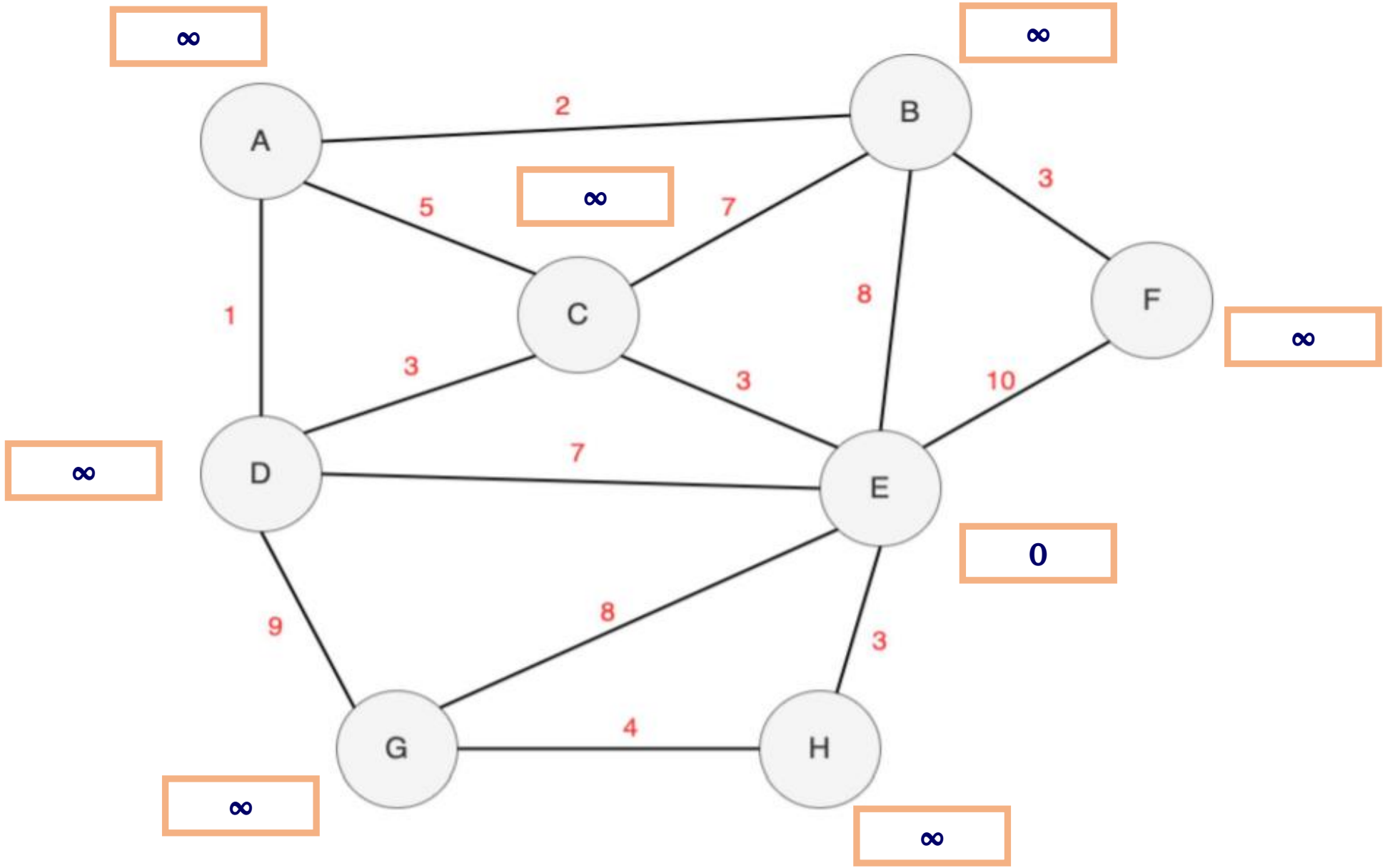
Question 2: Trace the operation of Prim's minimum spanning tree algorithm for the graph in Figure 1. Use vertex E as your start vertex.

Shapes:

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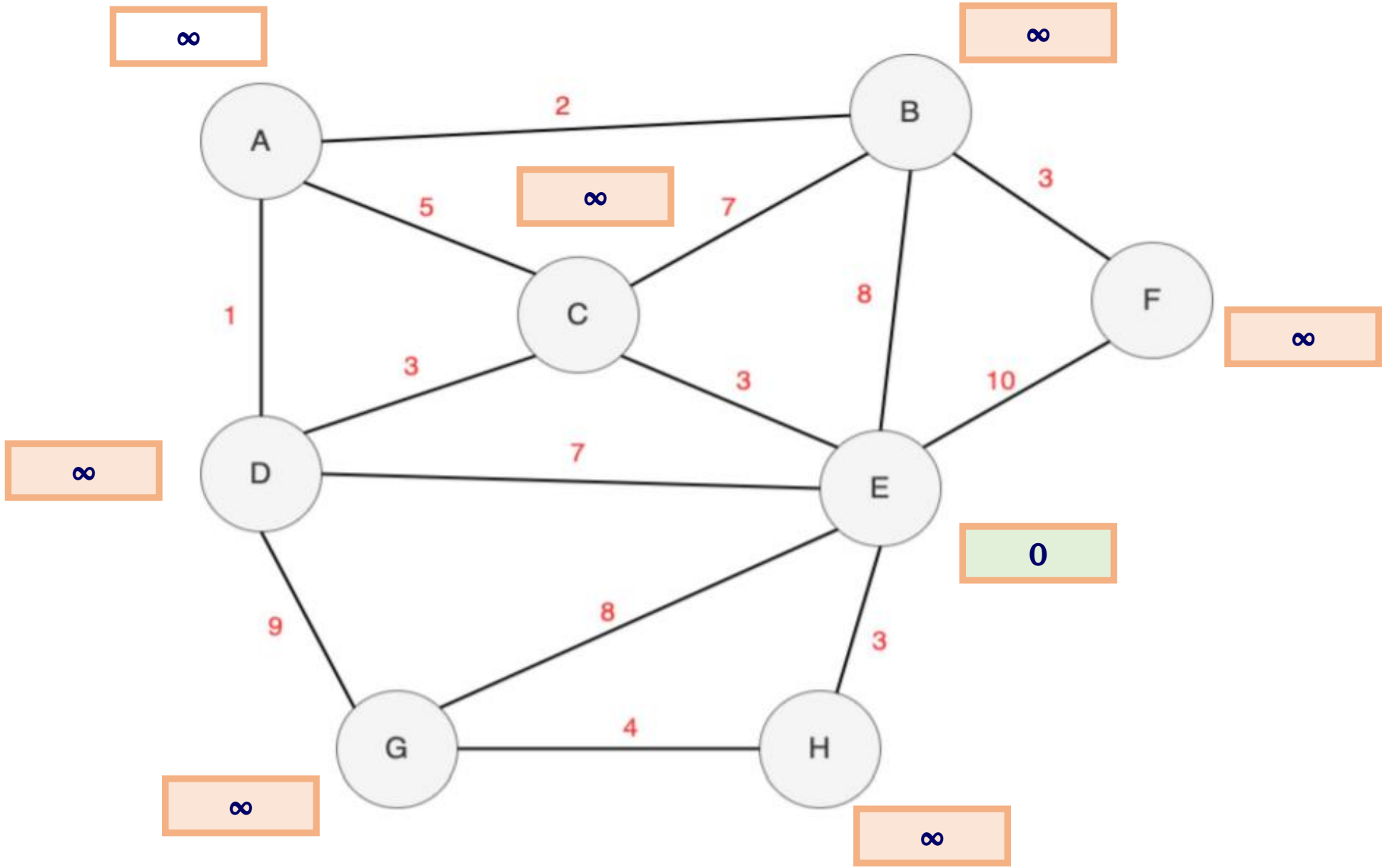
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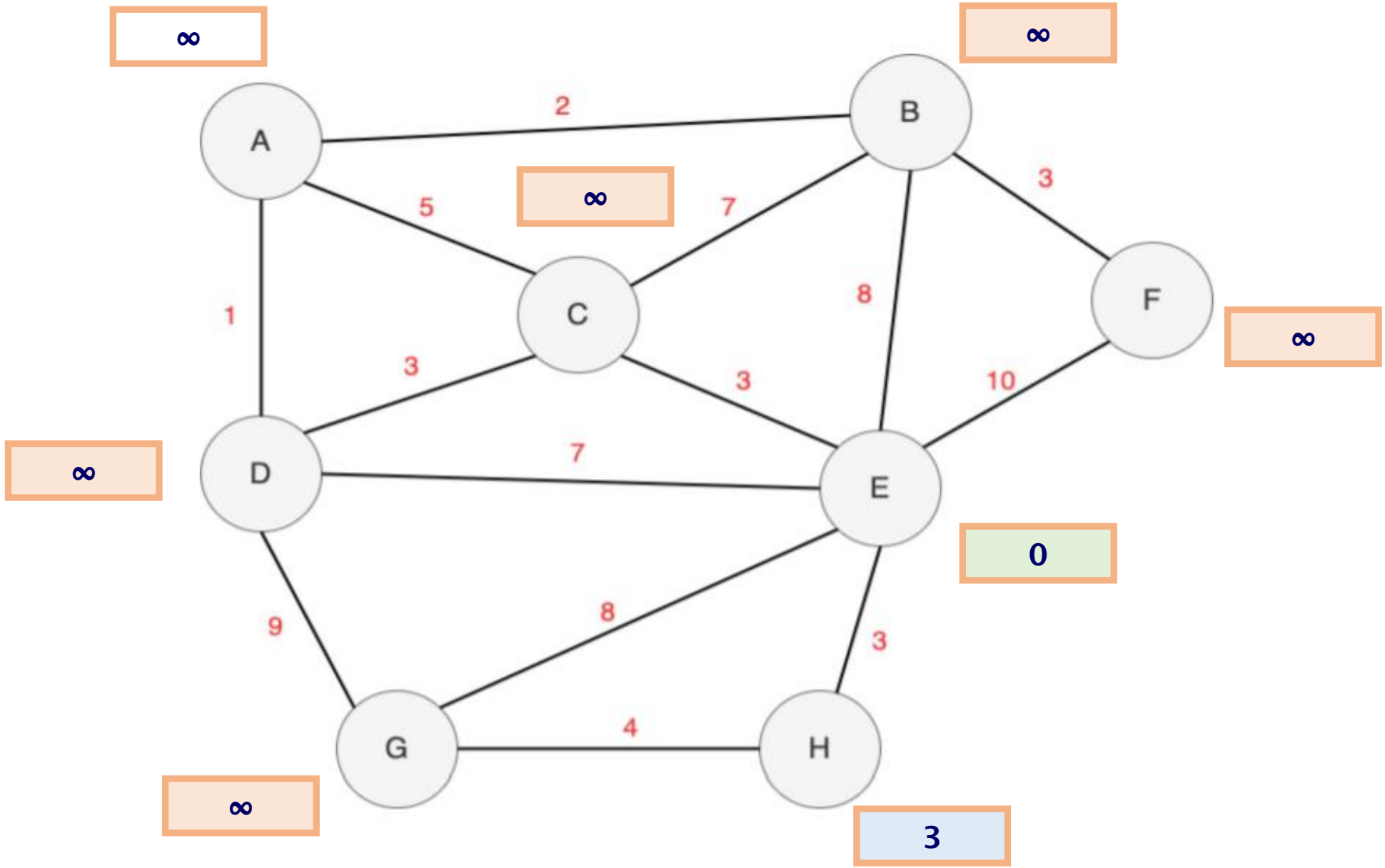
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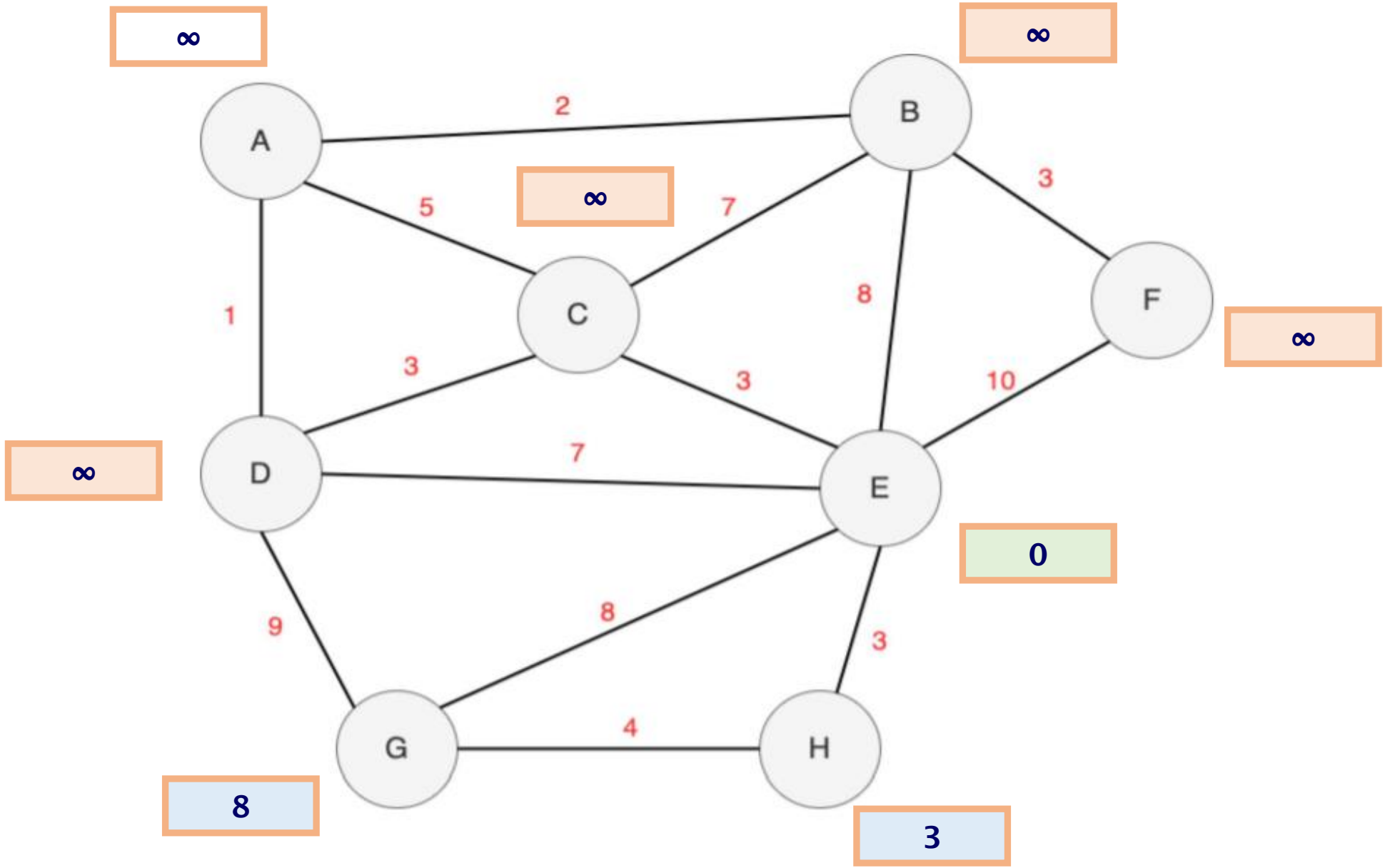
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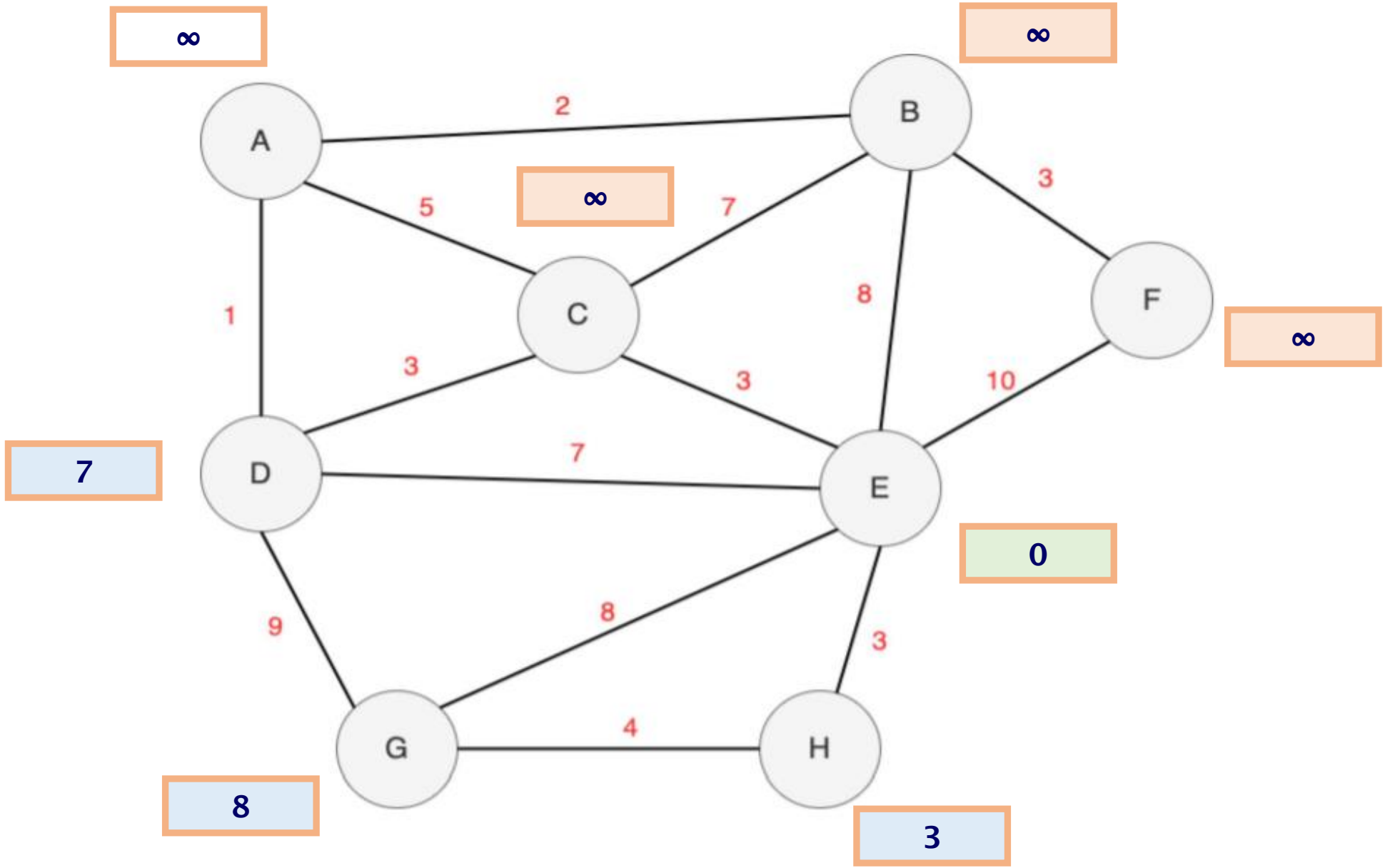
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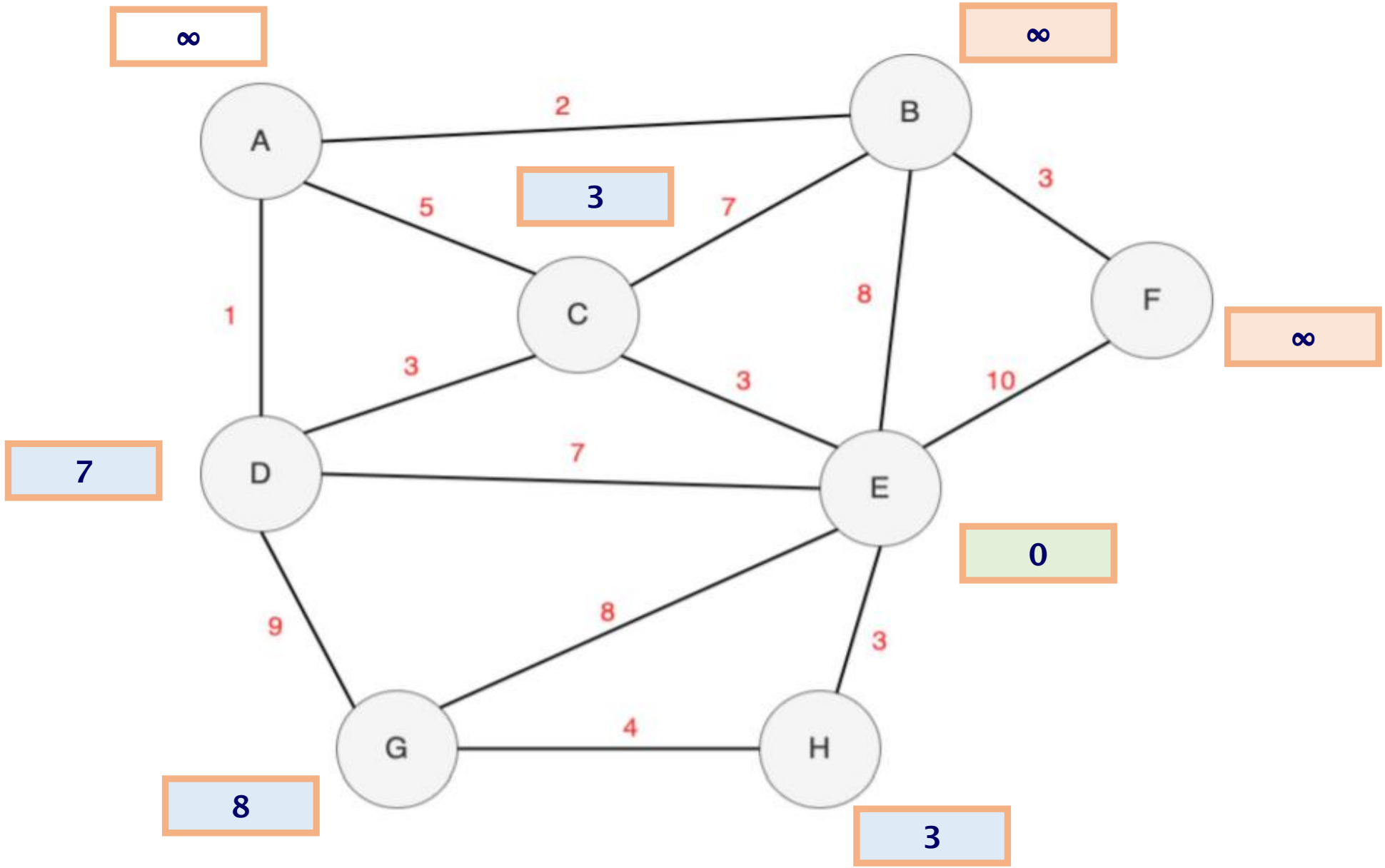
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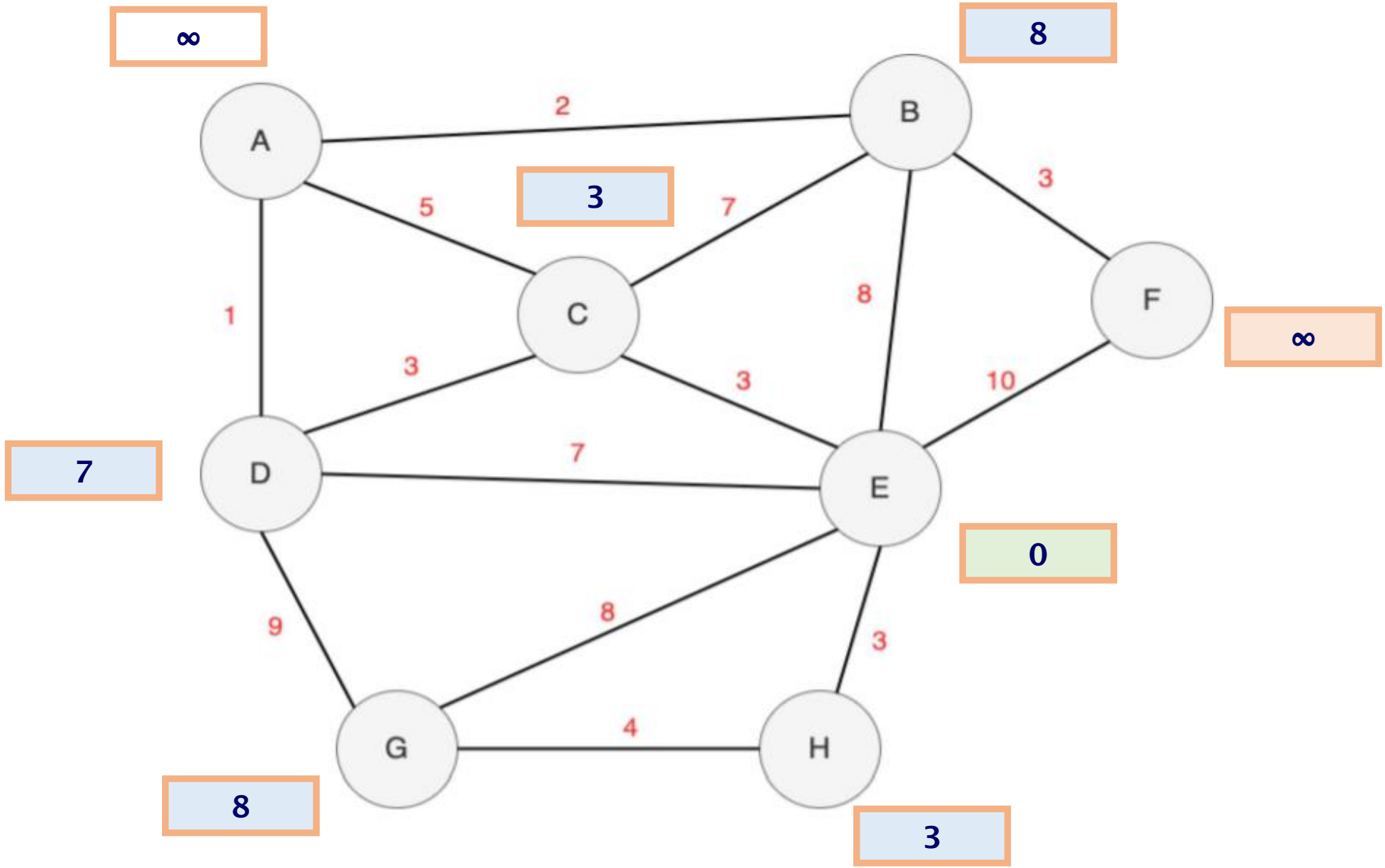
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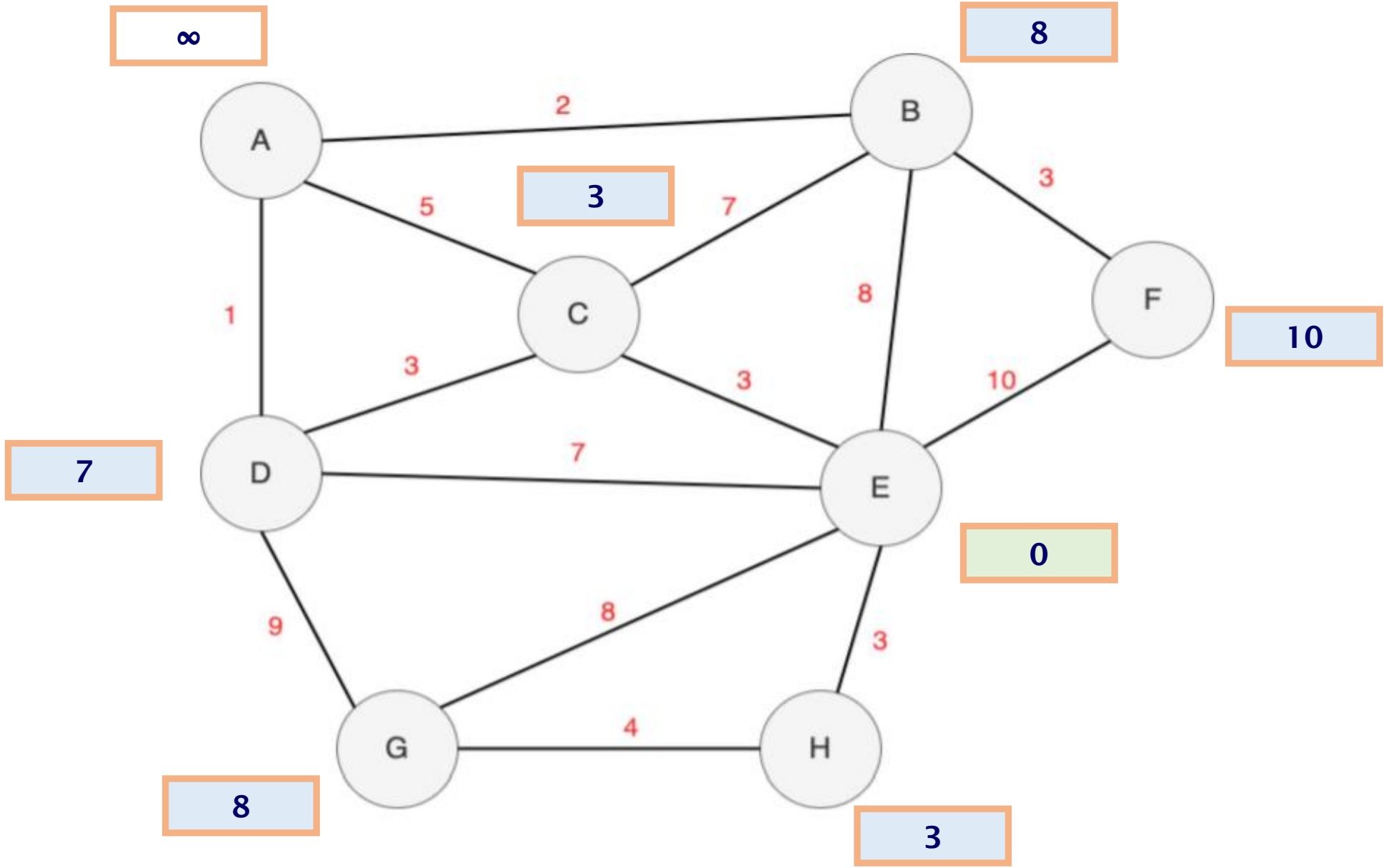
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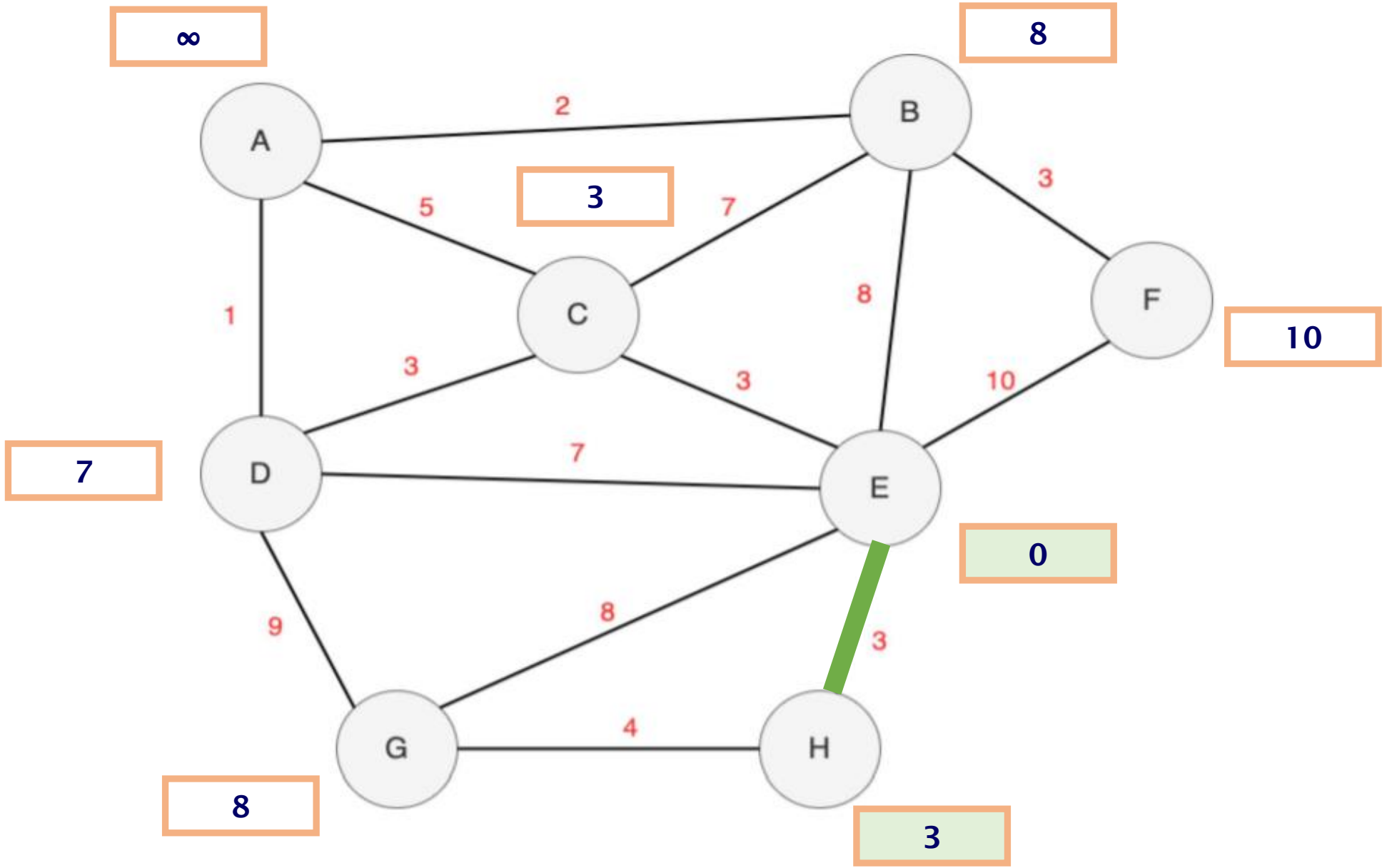
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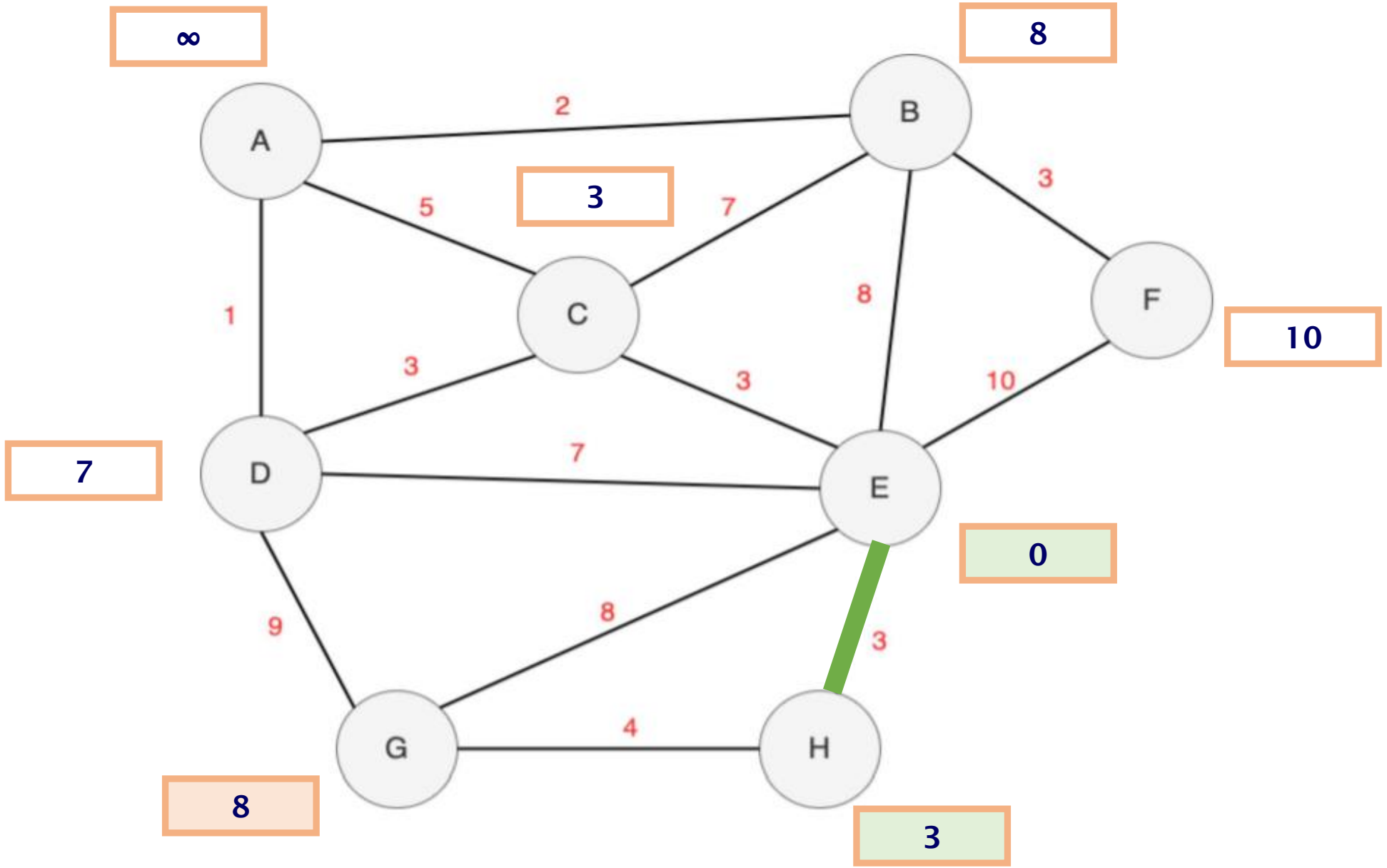
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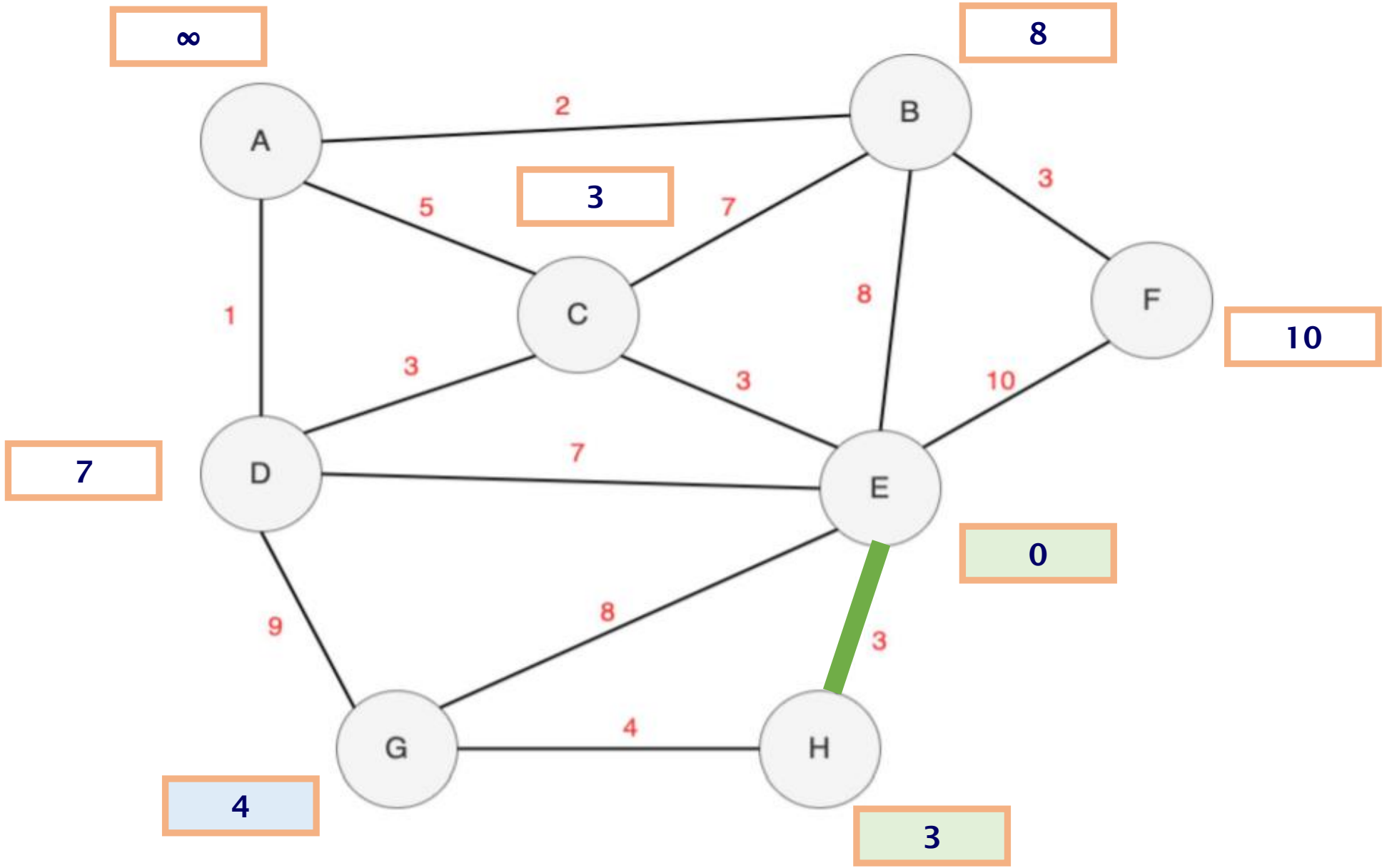
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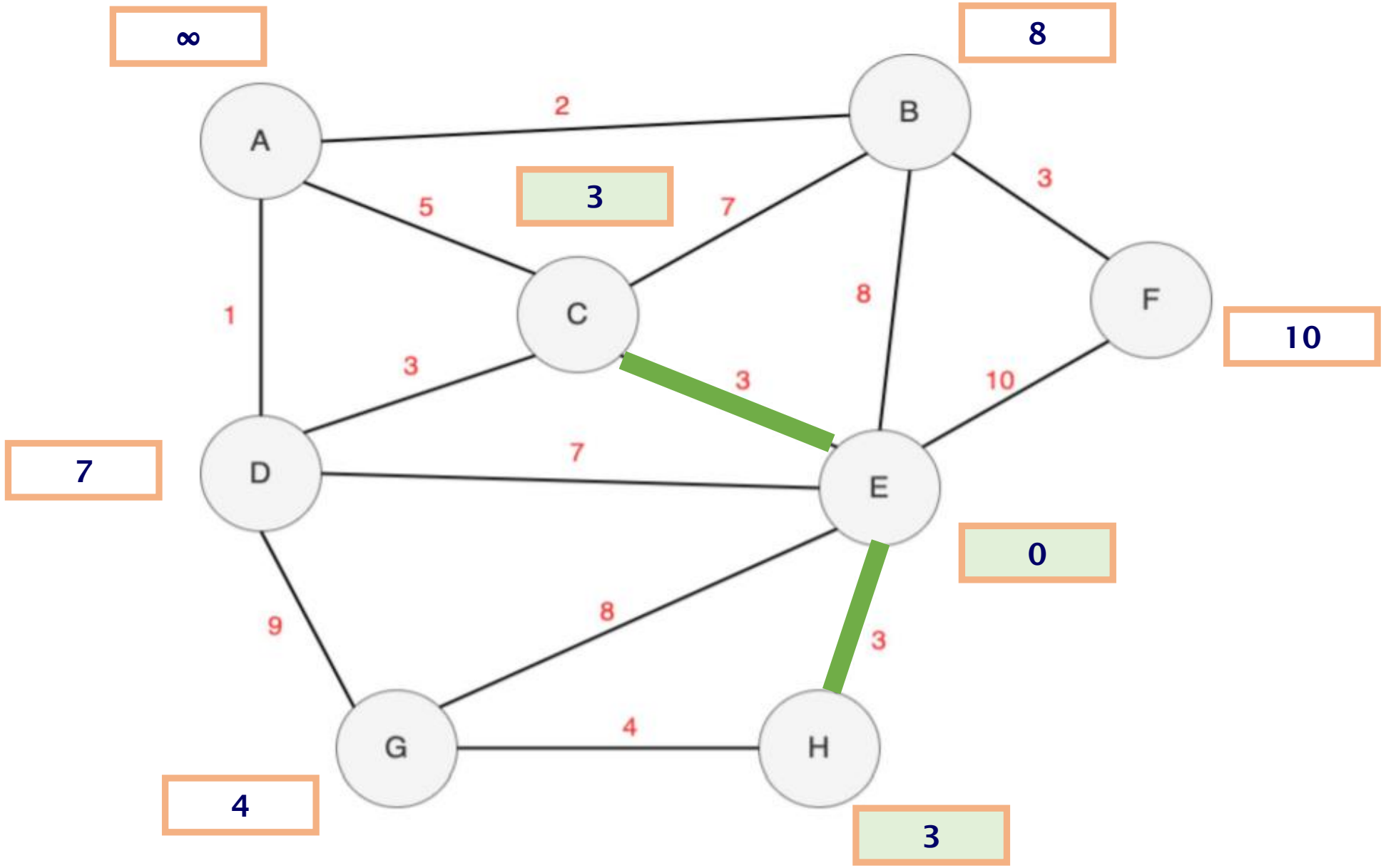
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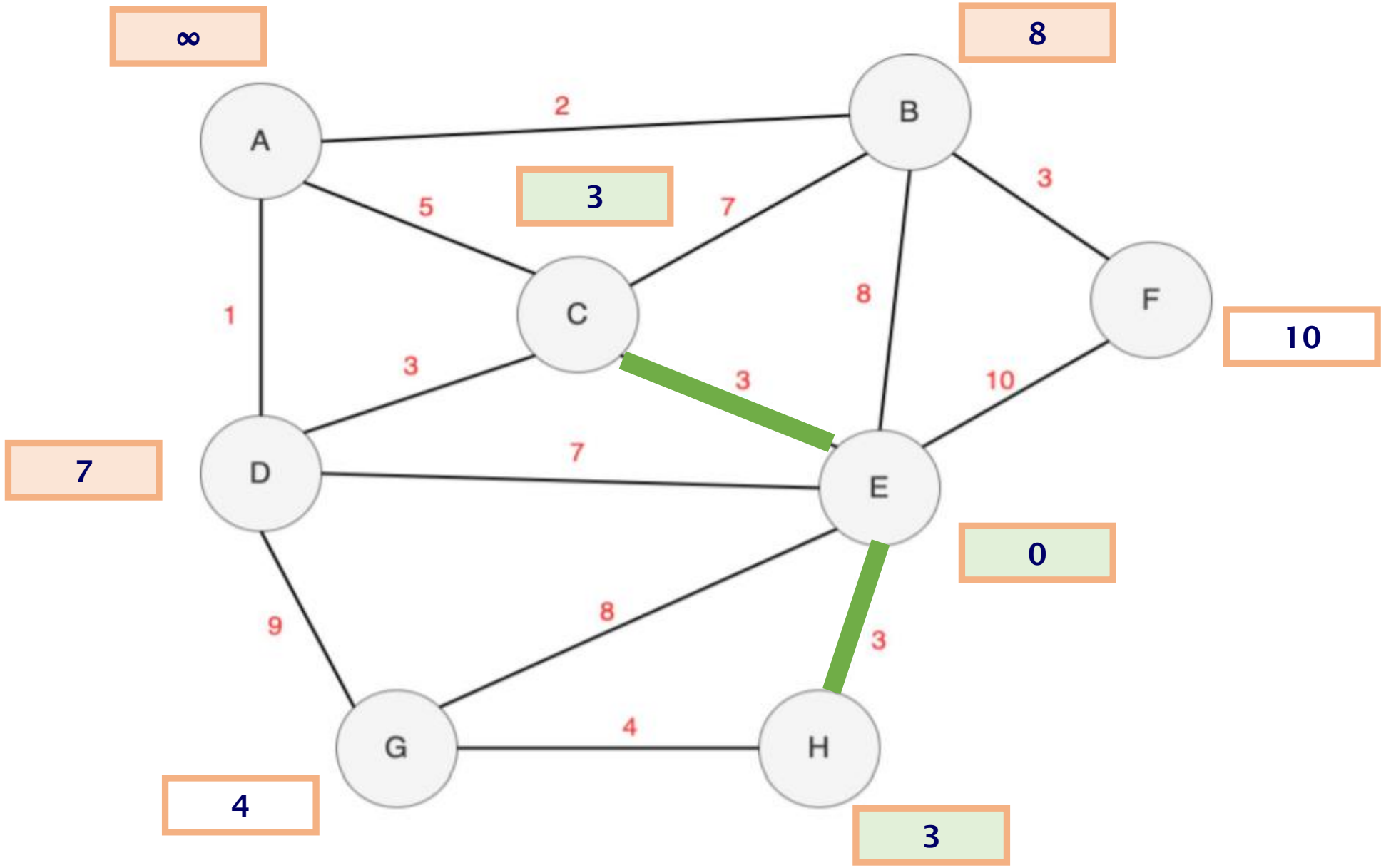
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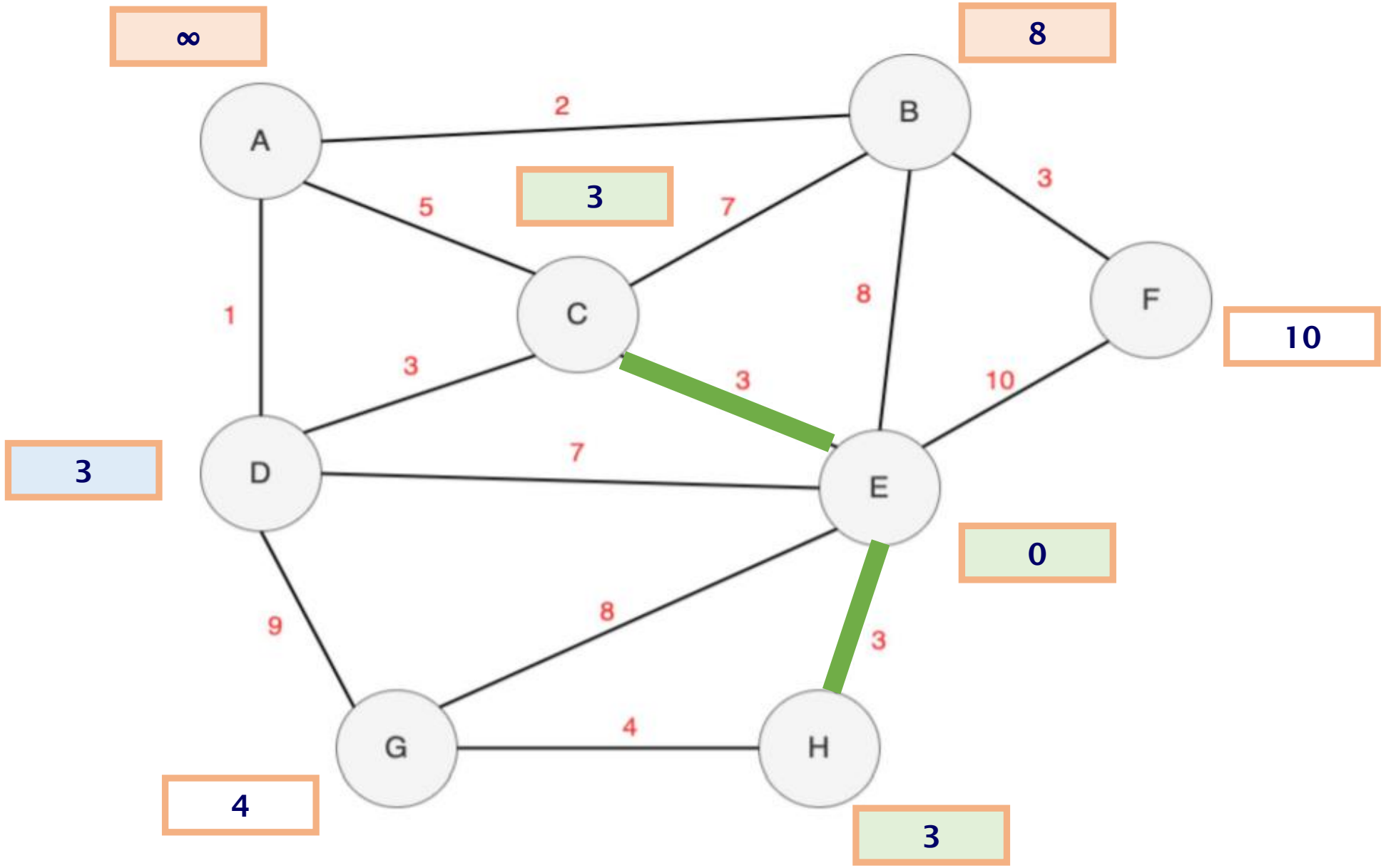
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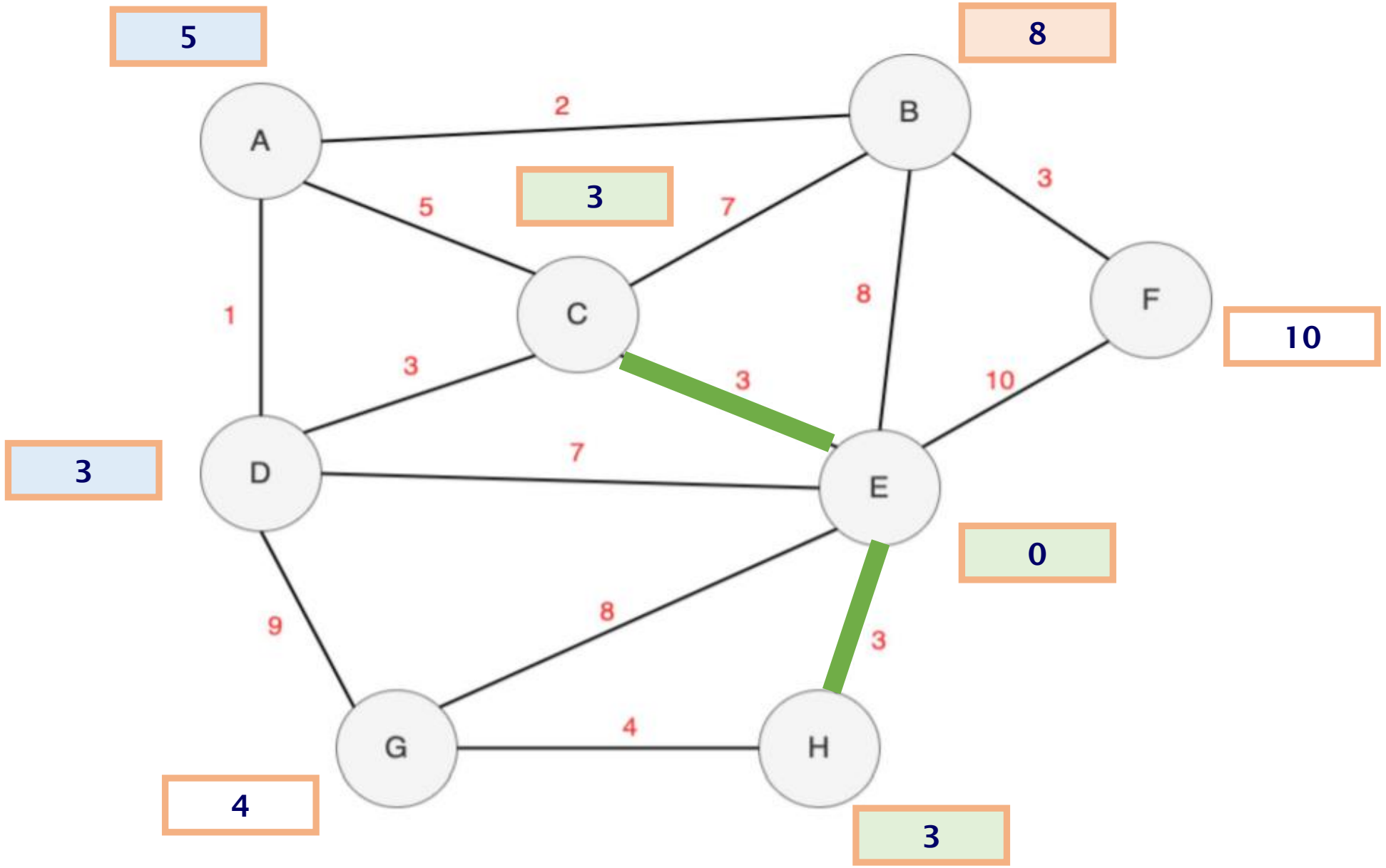
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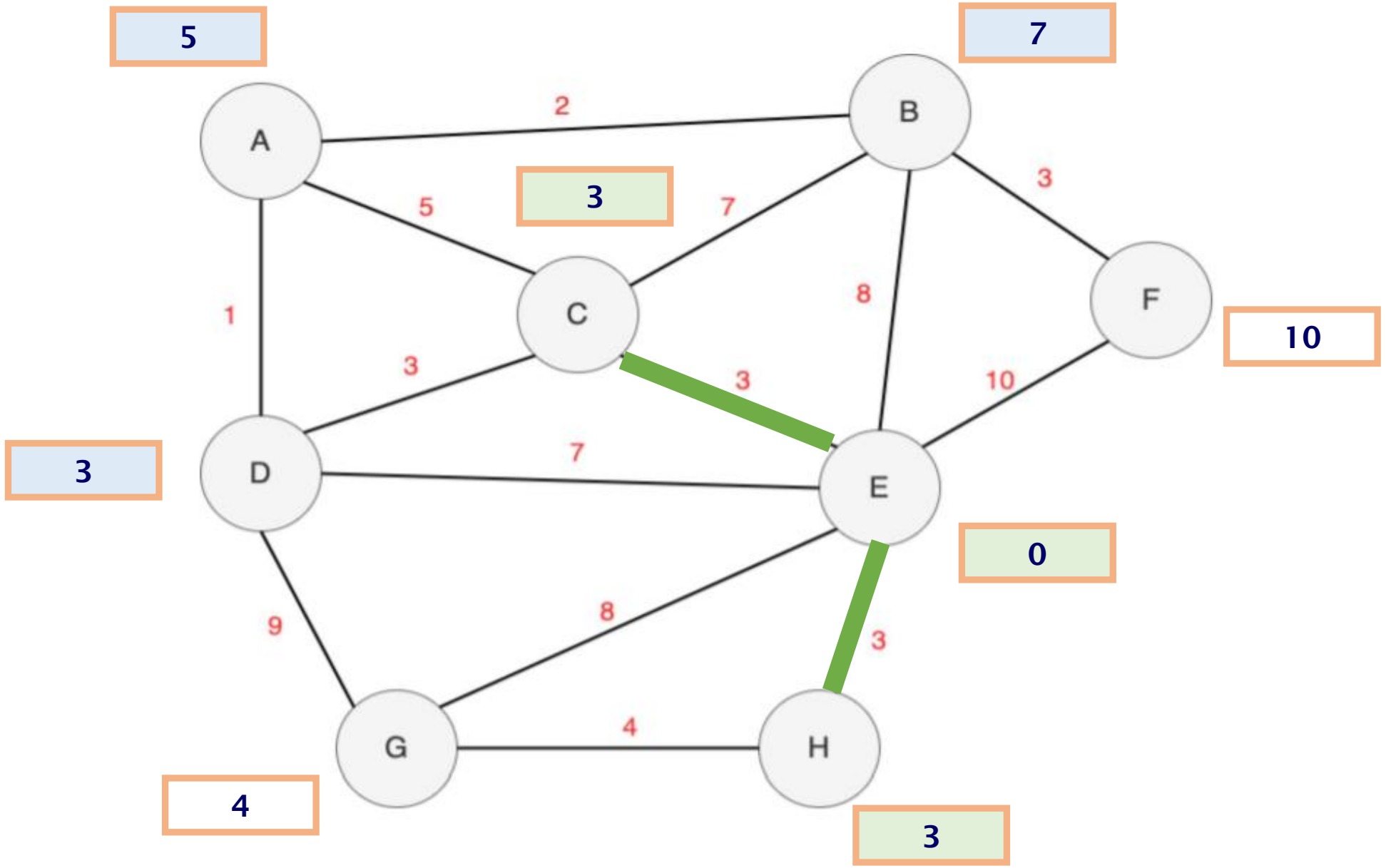
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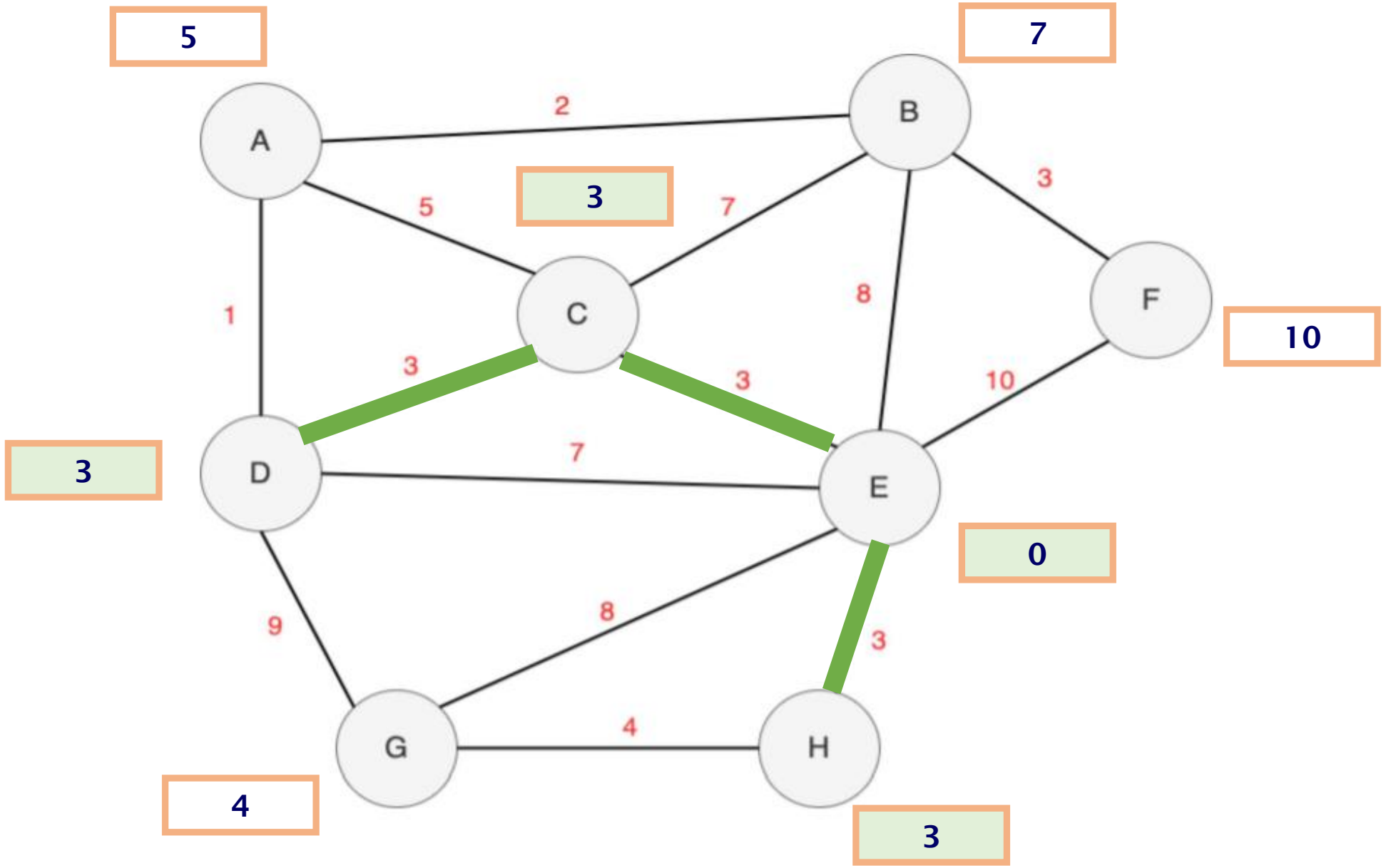
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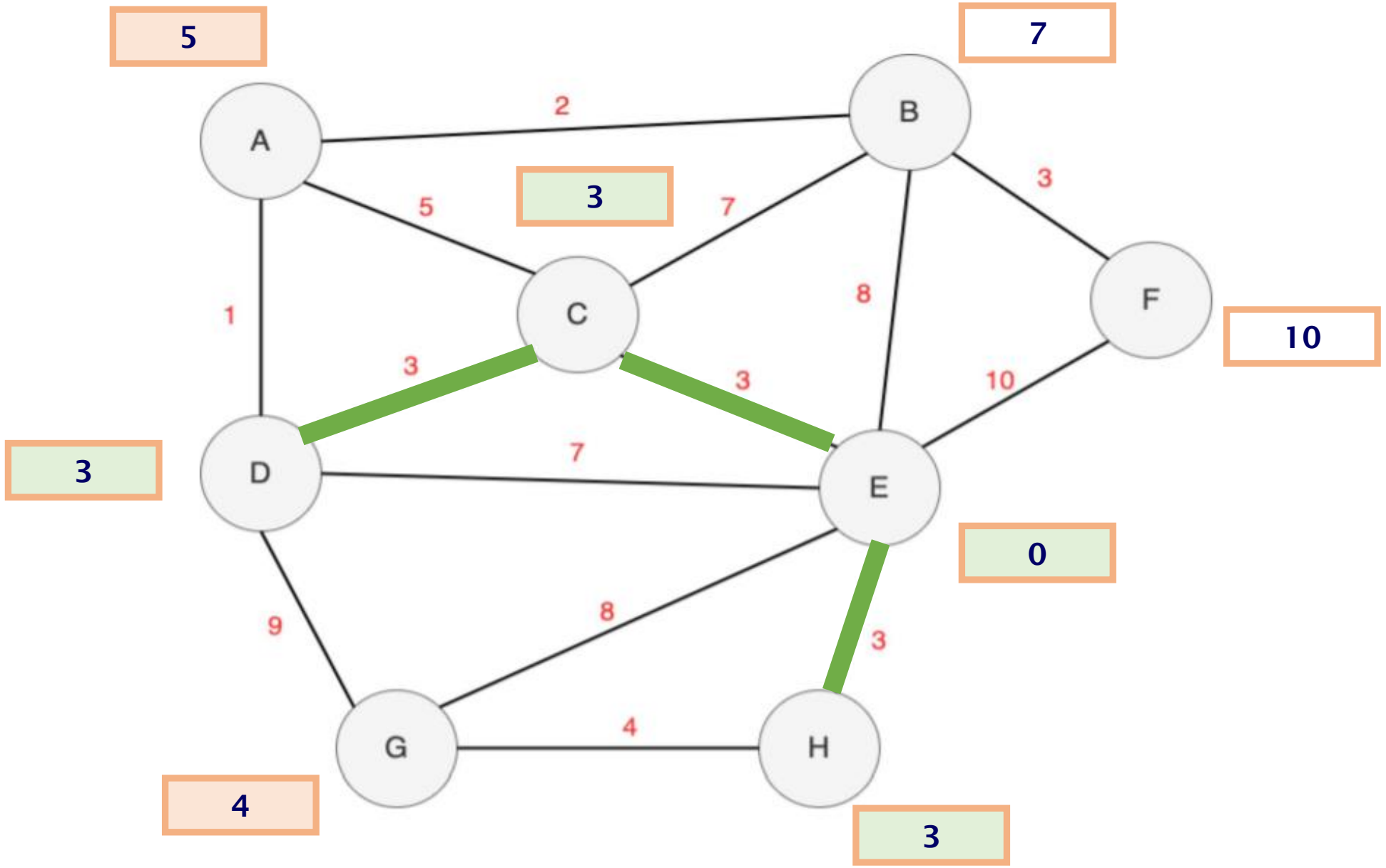
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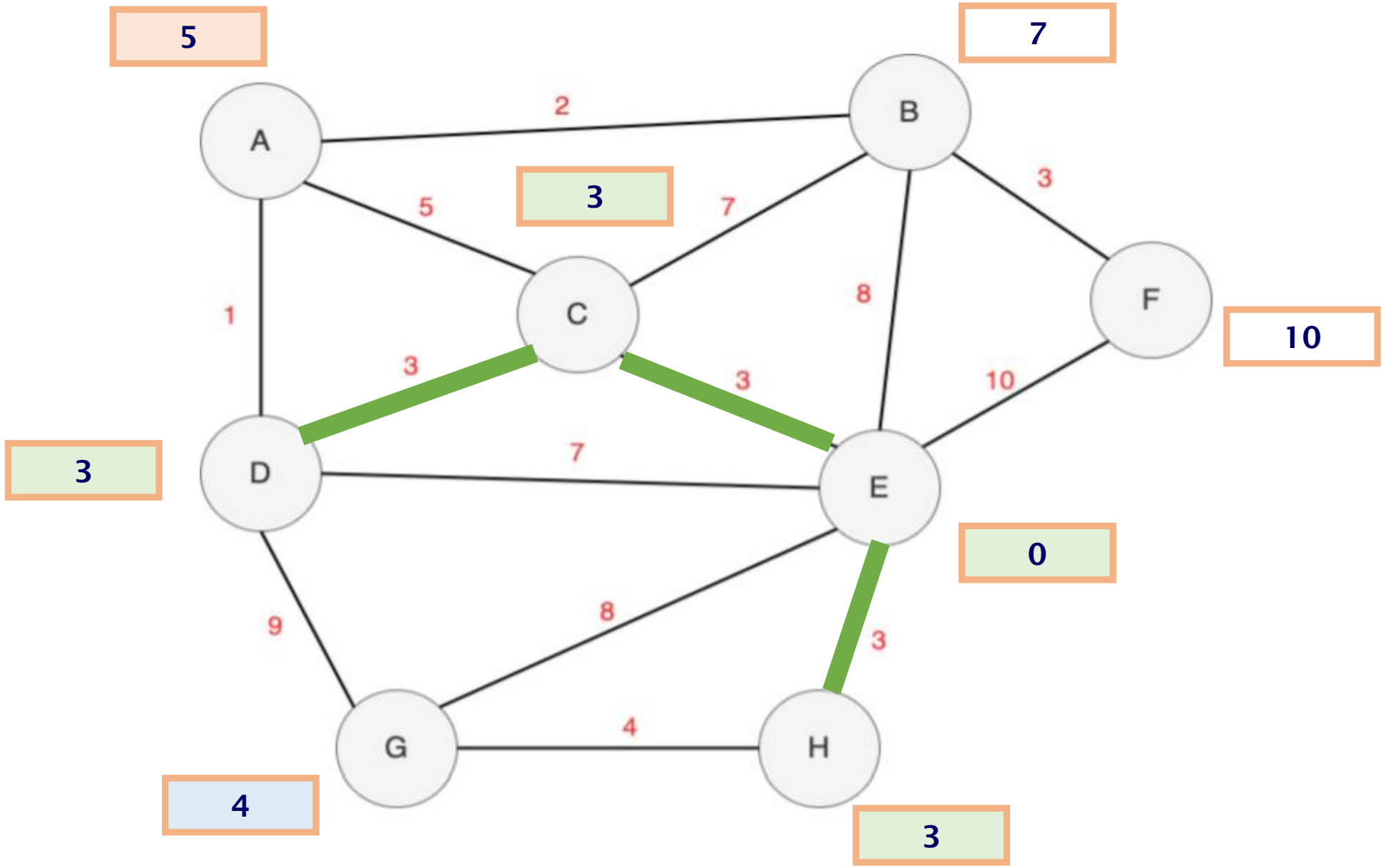
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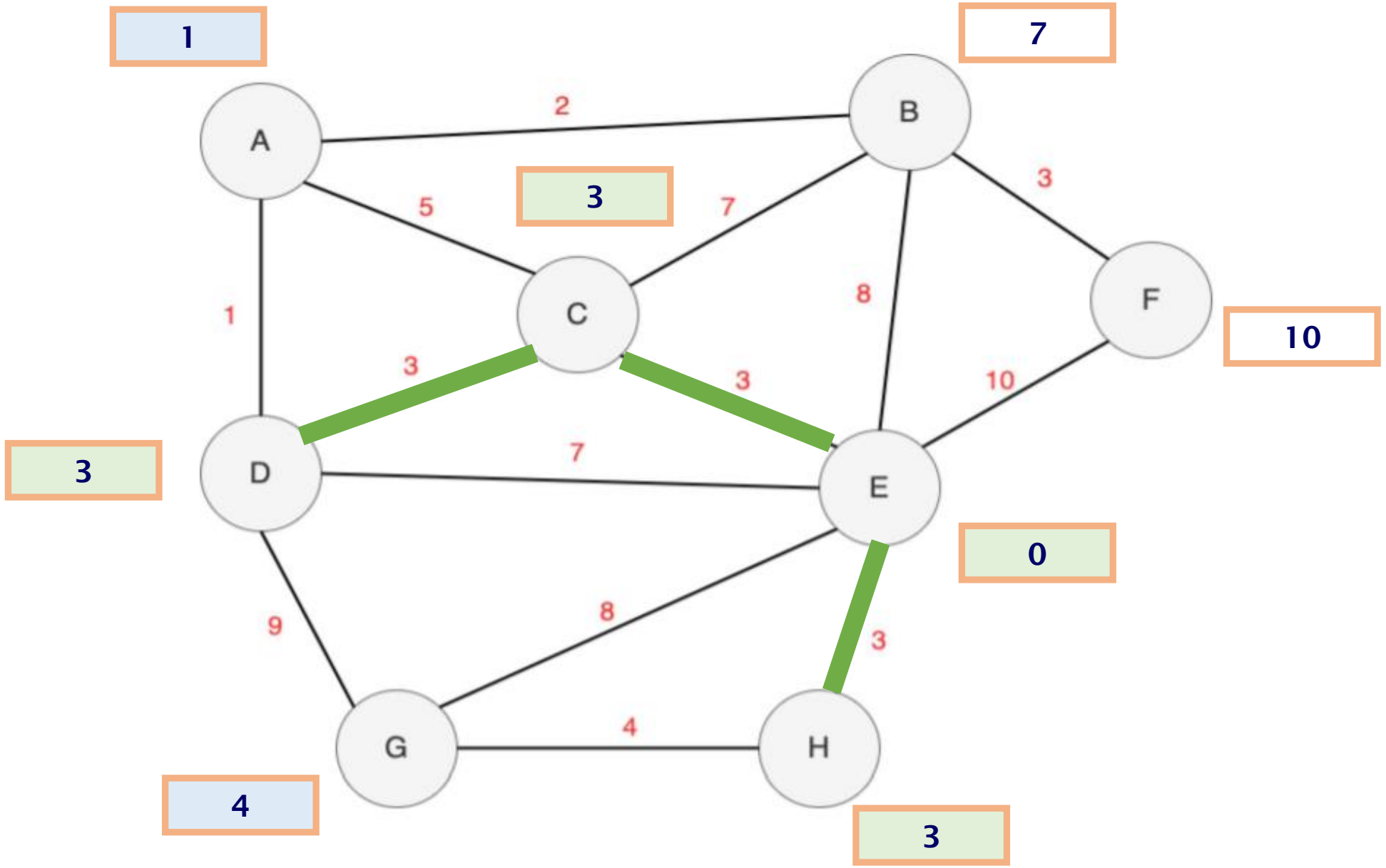
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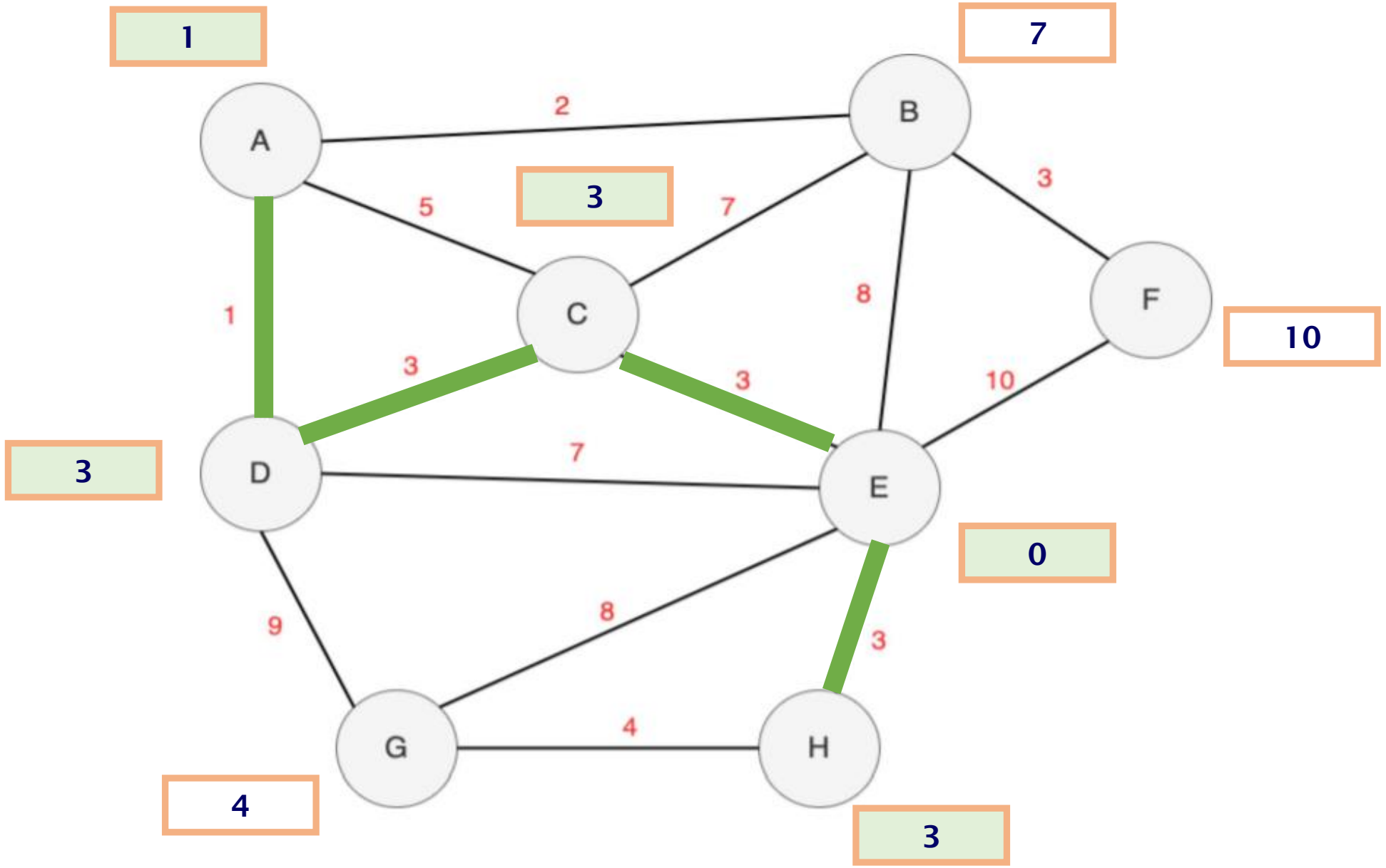
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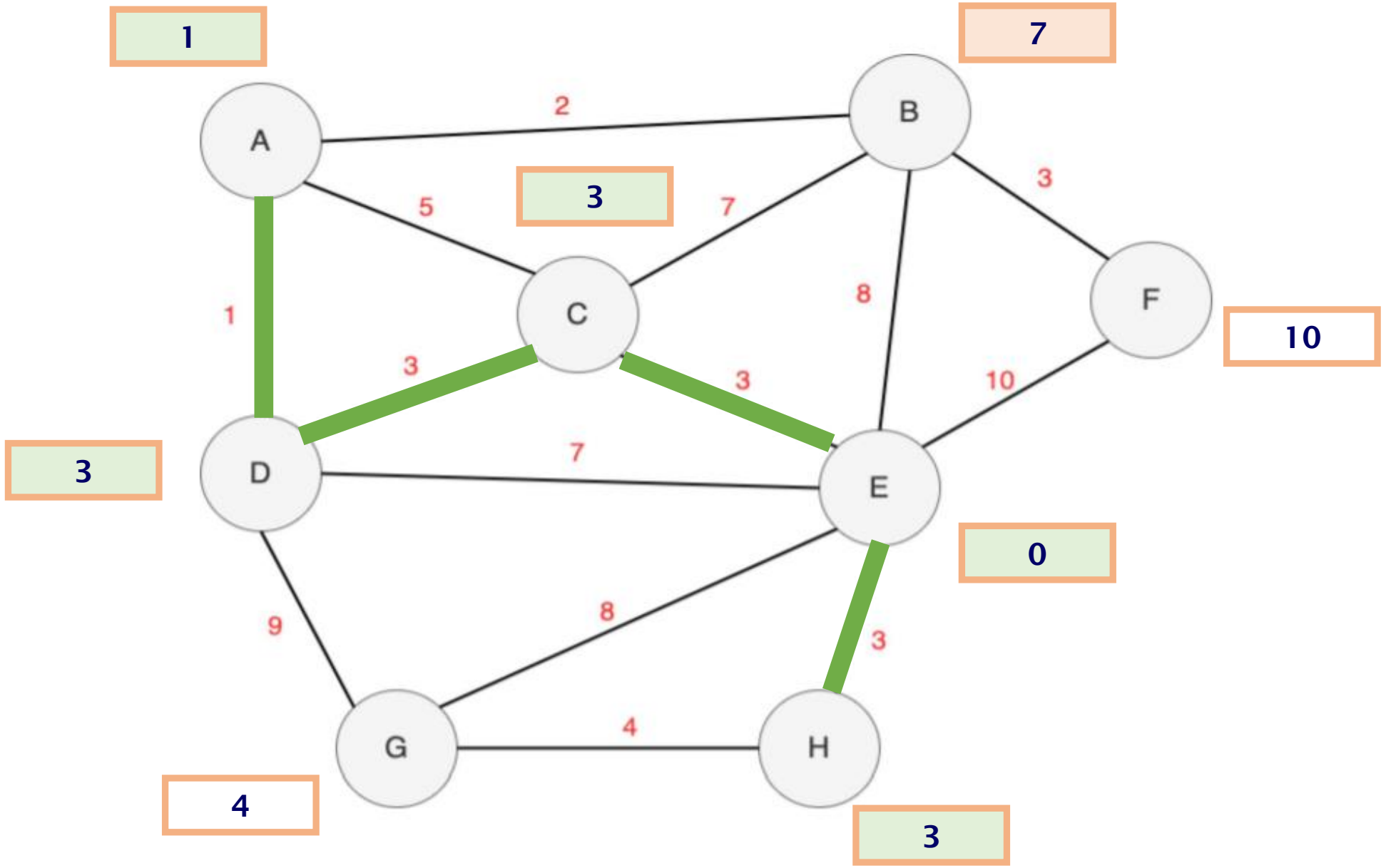
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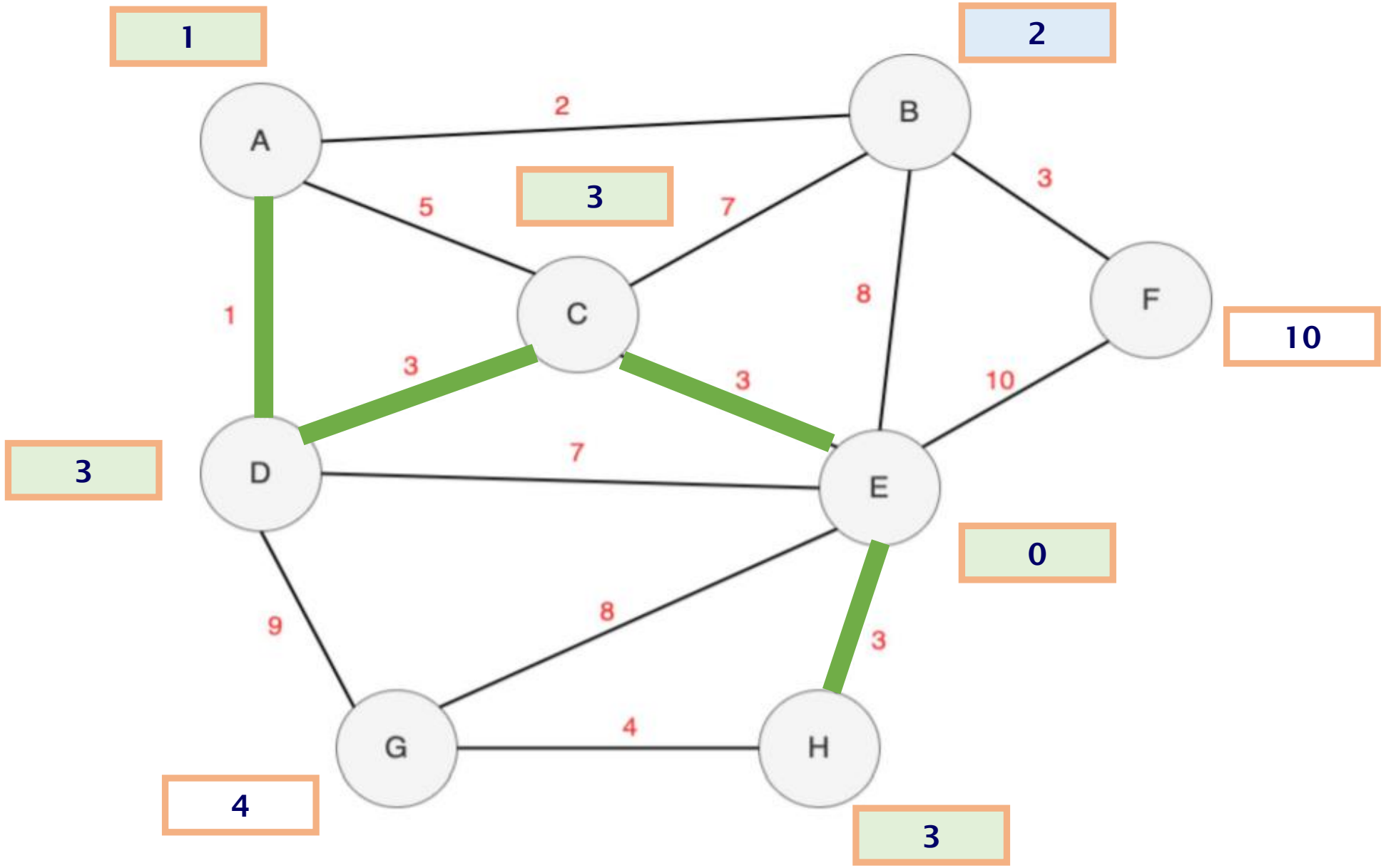
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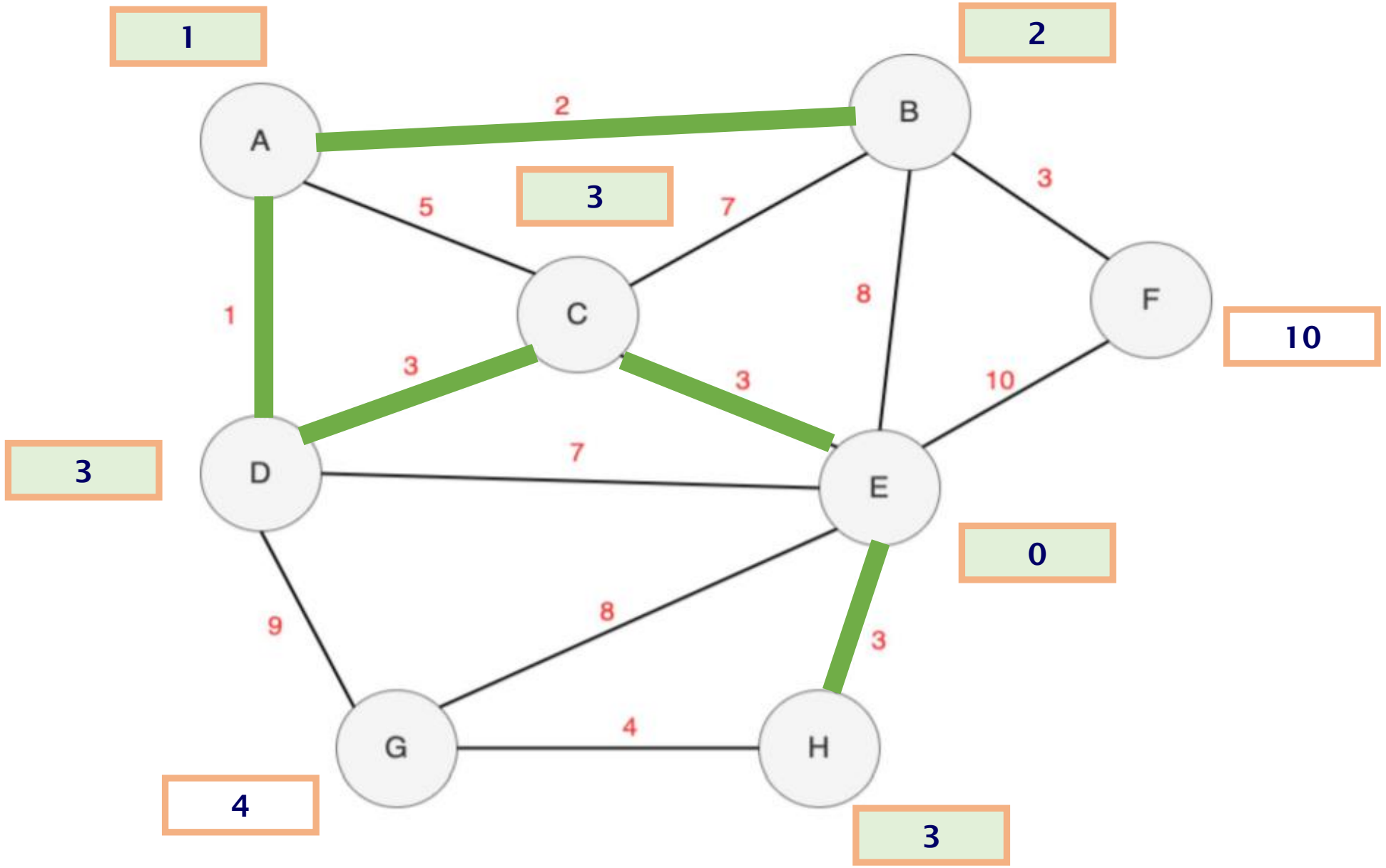
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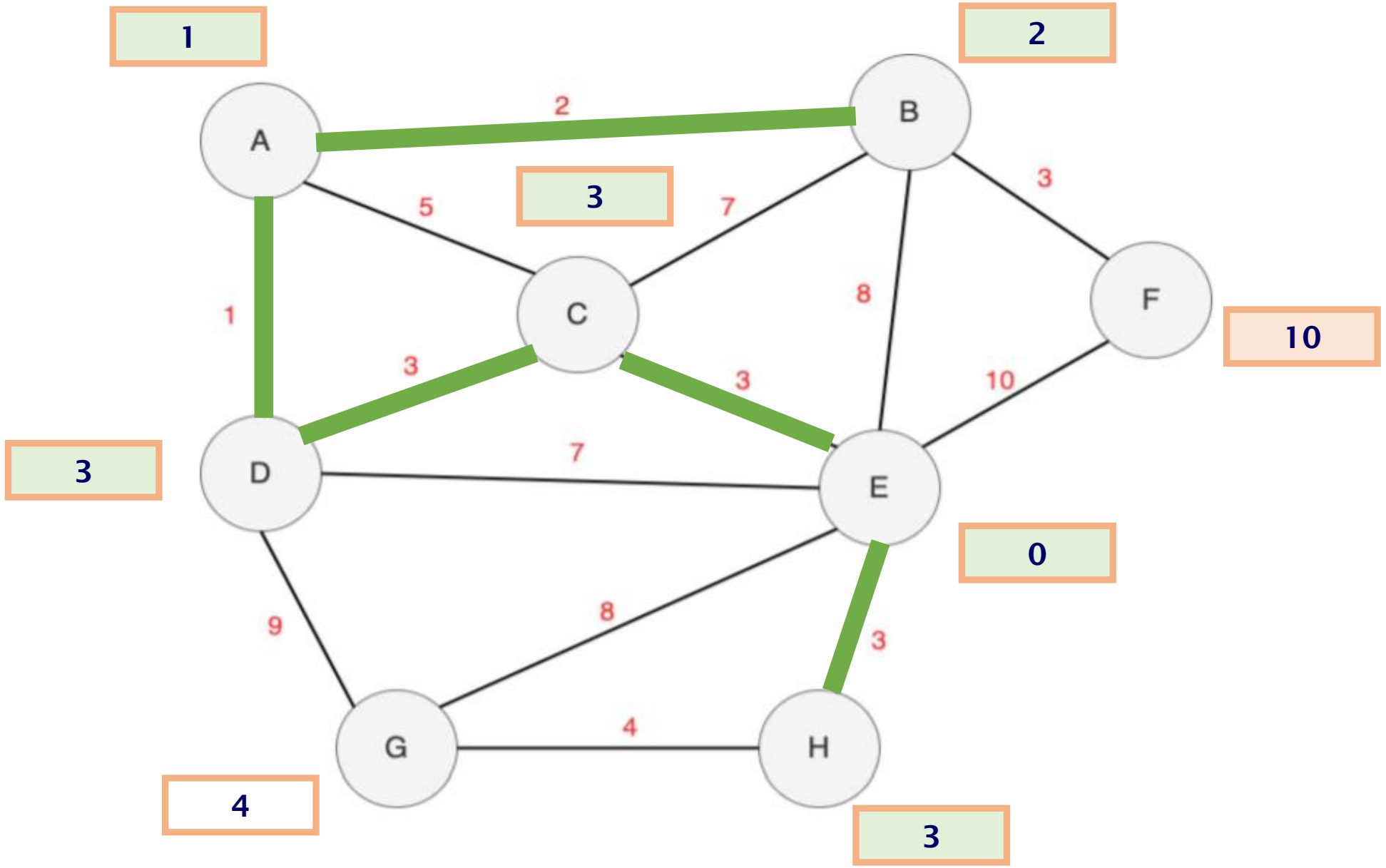
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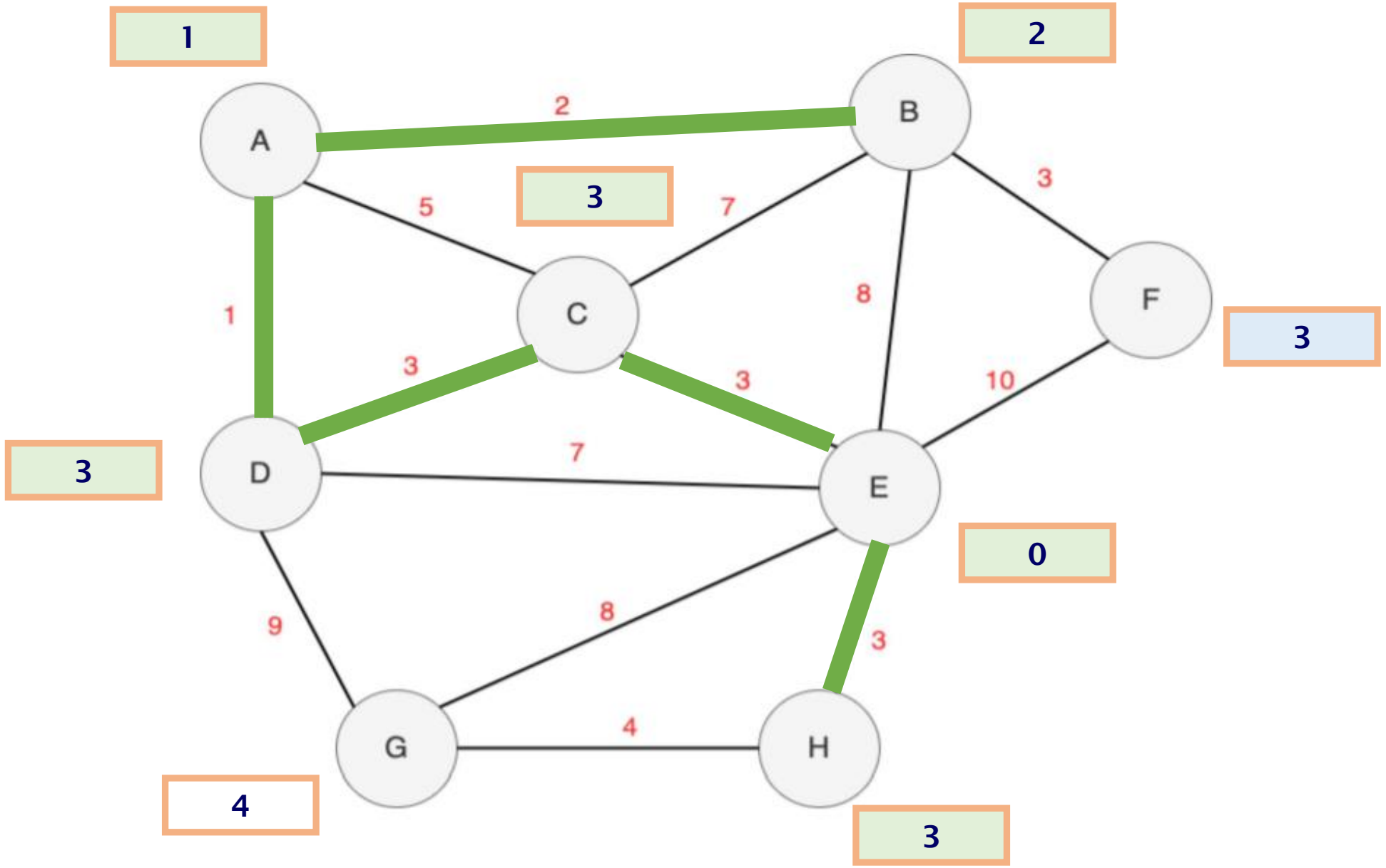
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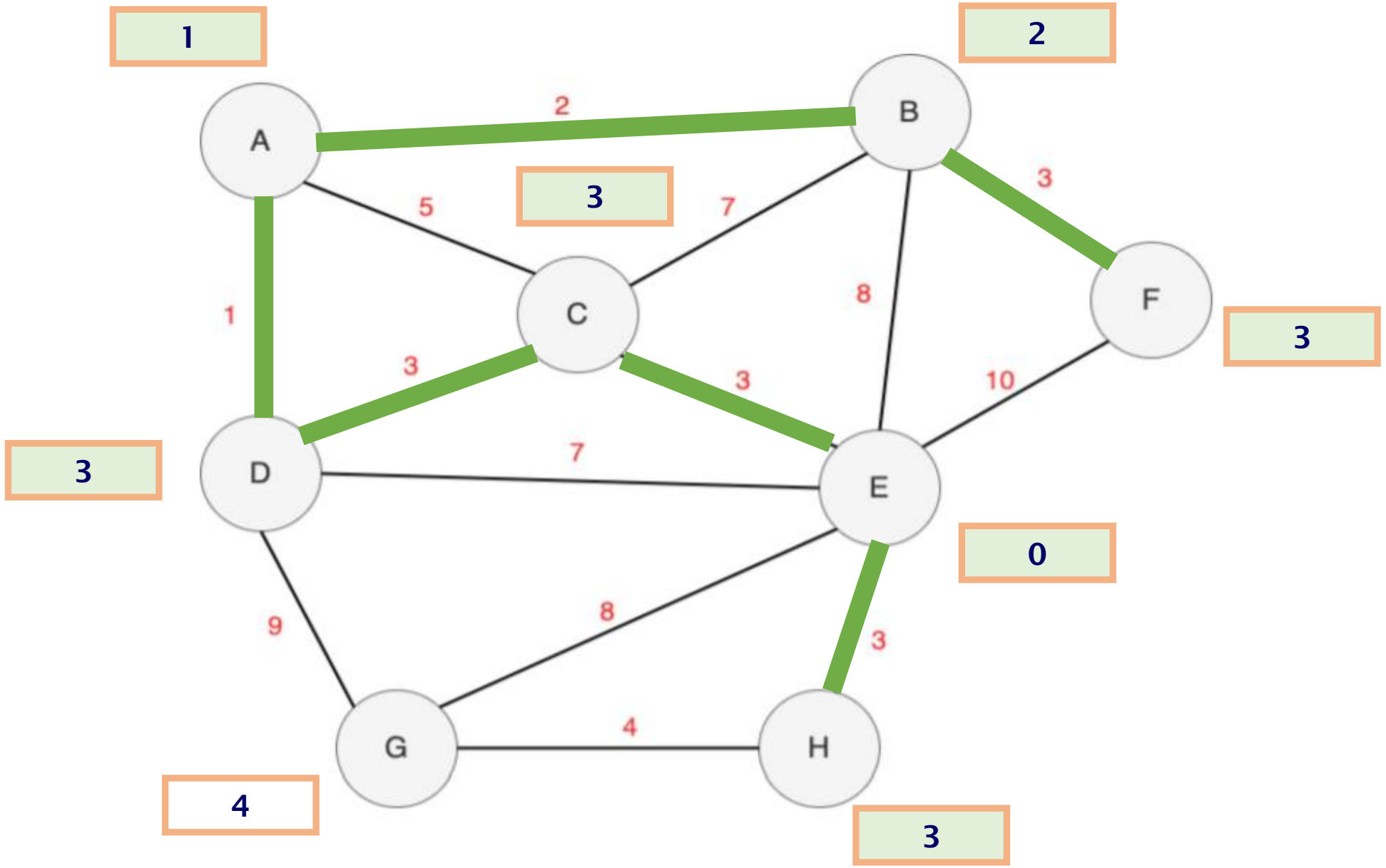
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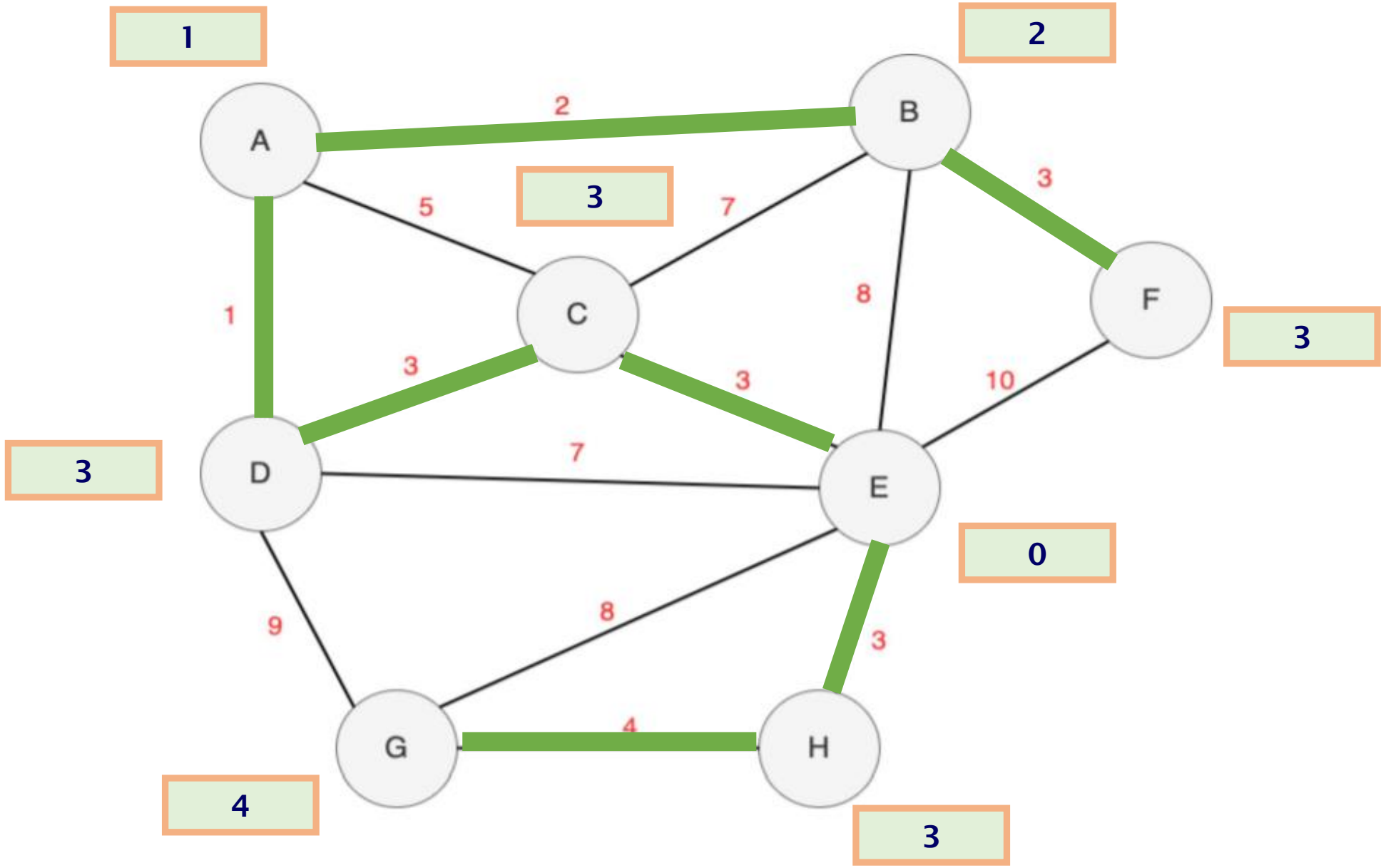
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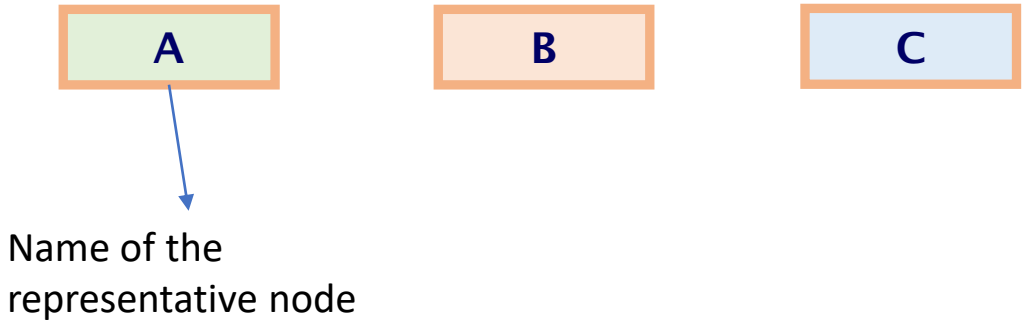
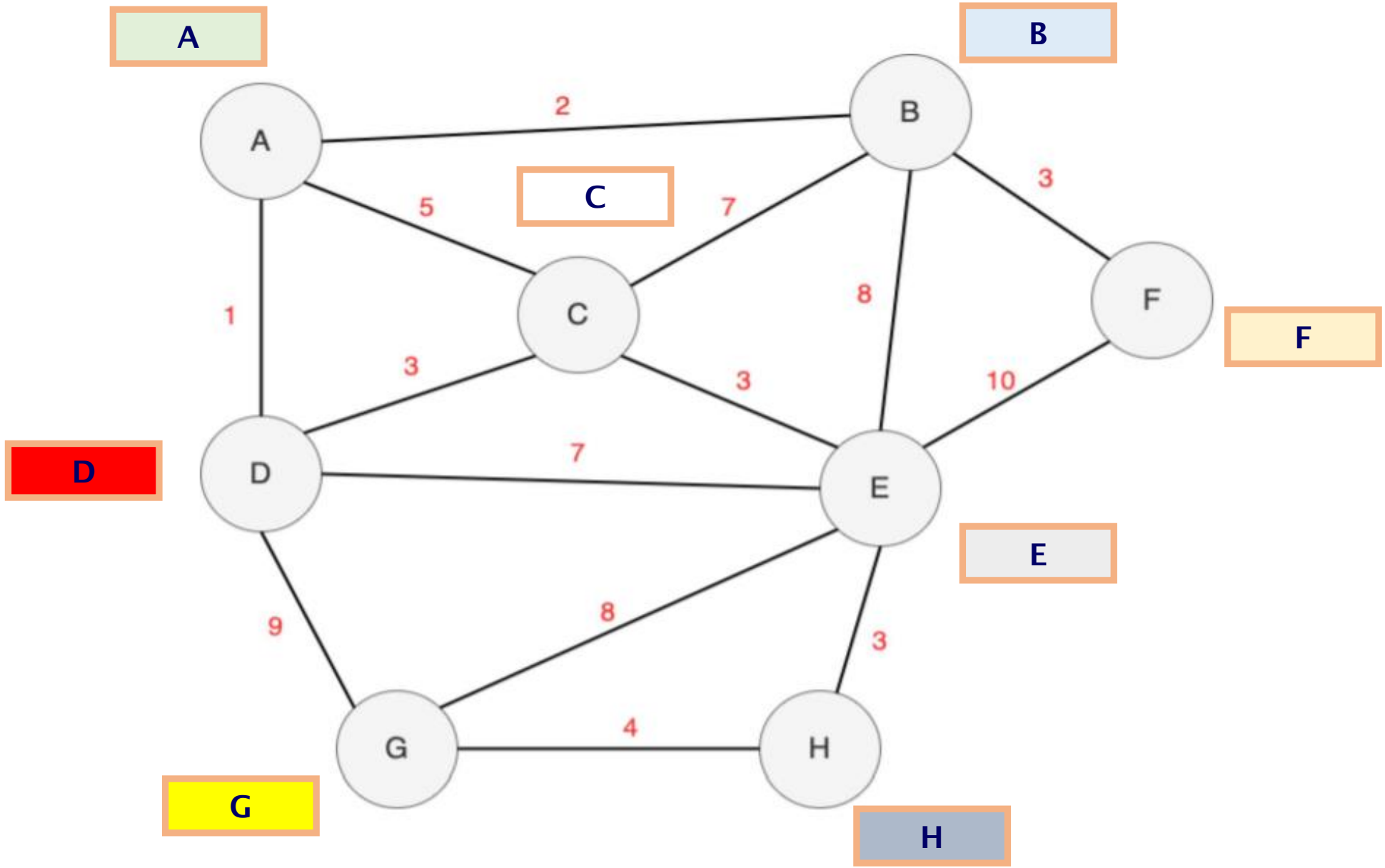
Question 3: Trace the operation of Kruskal's minimum spanning tree algorithm for the graph in Figure 1.

Shapes: Each different colors represents a disjoint set and letters indicates the representative node

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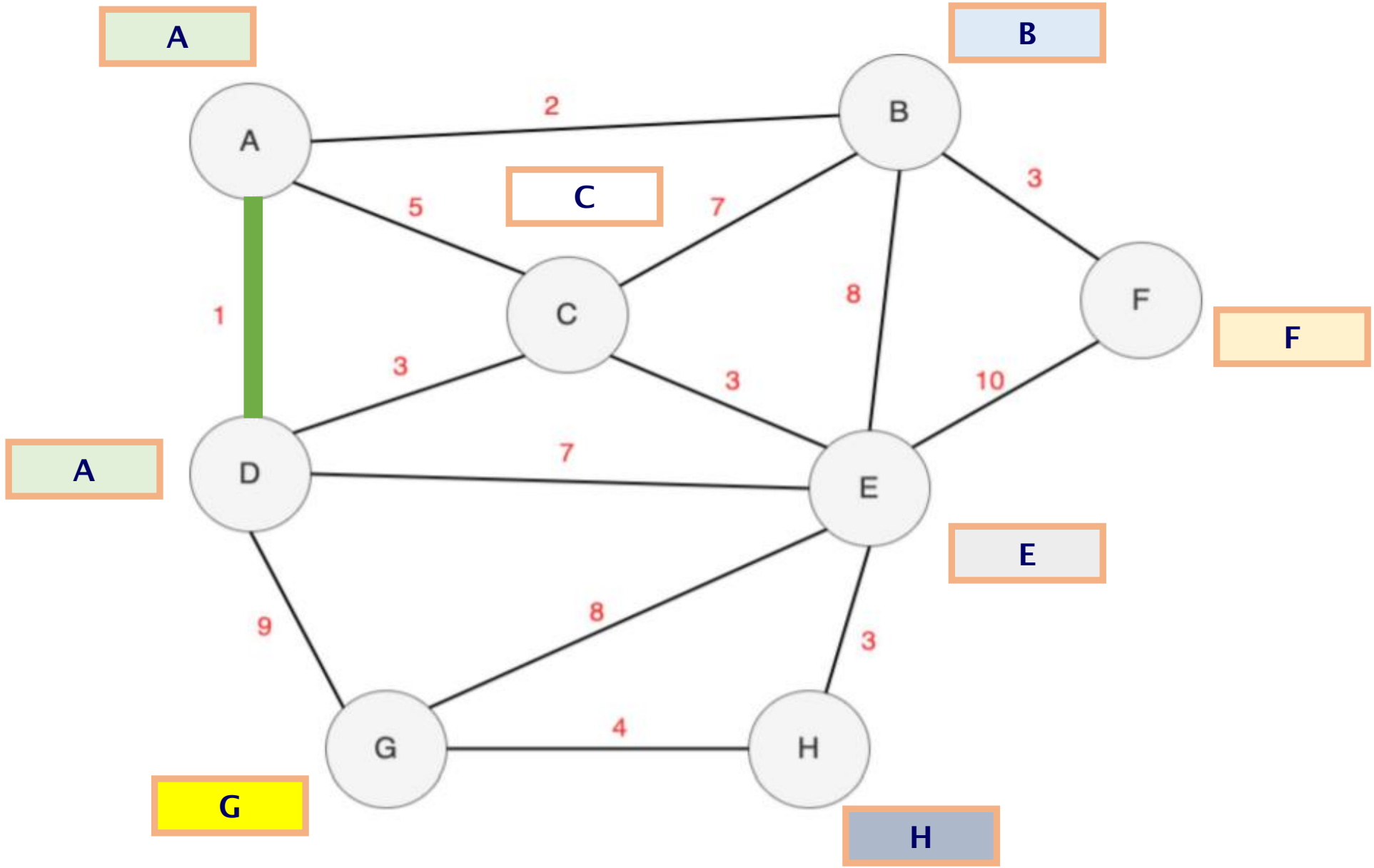
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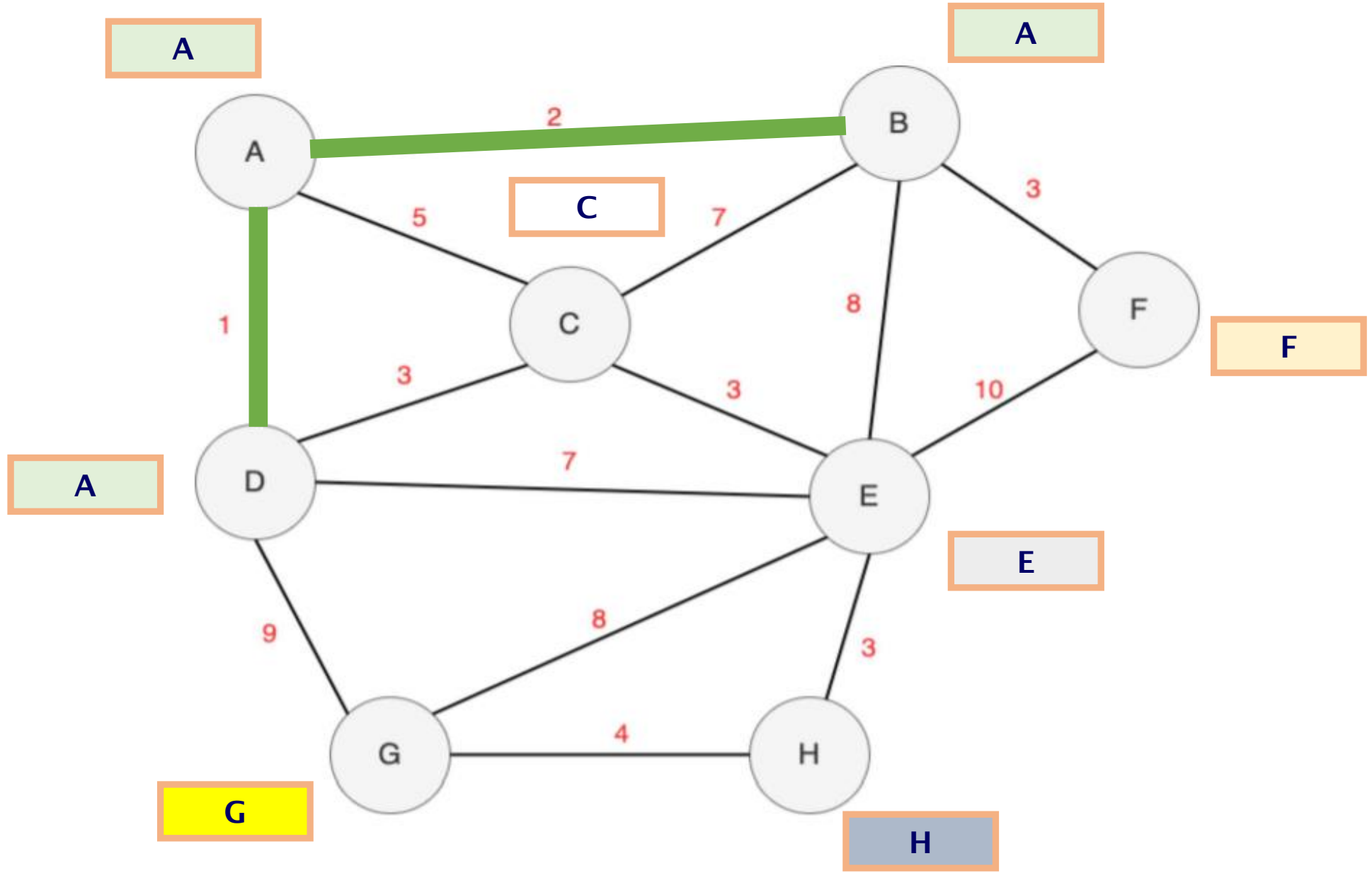
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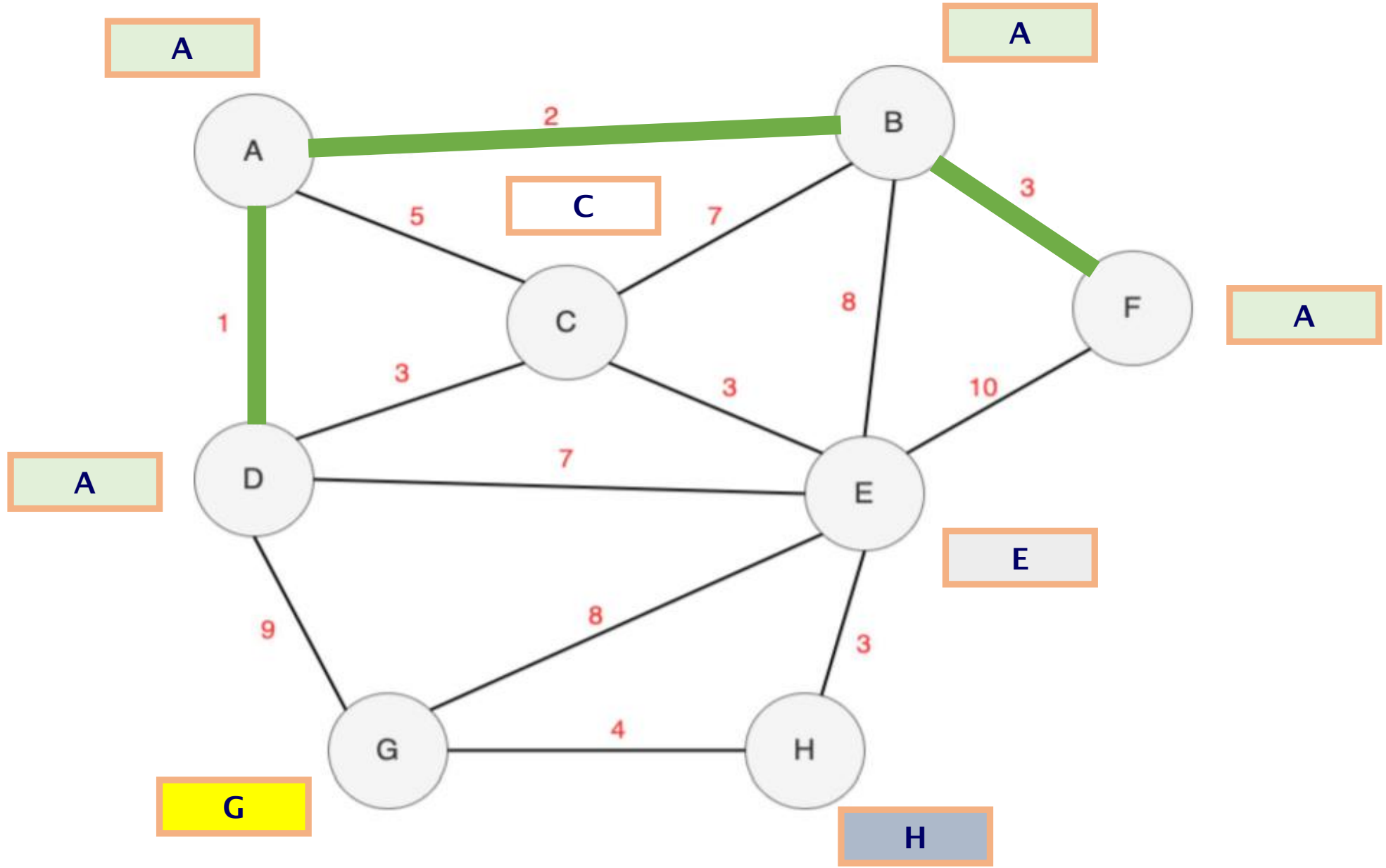
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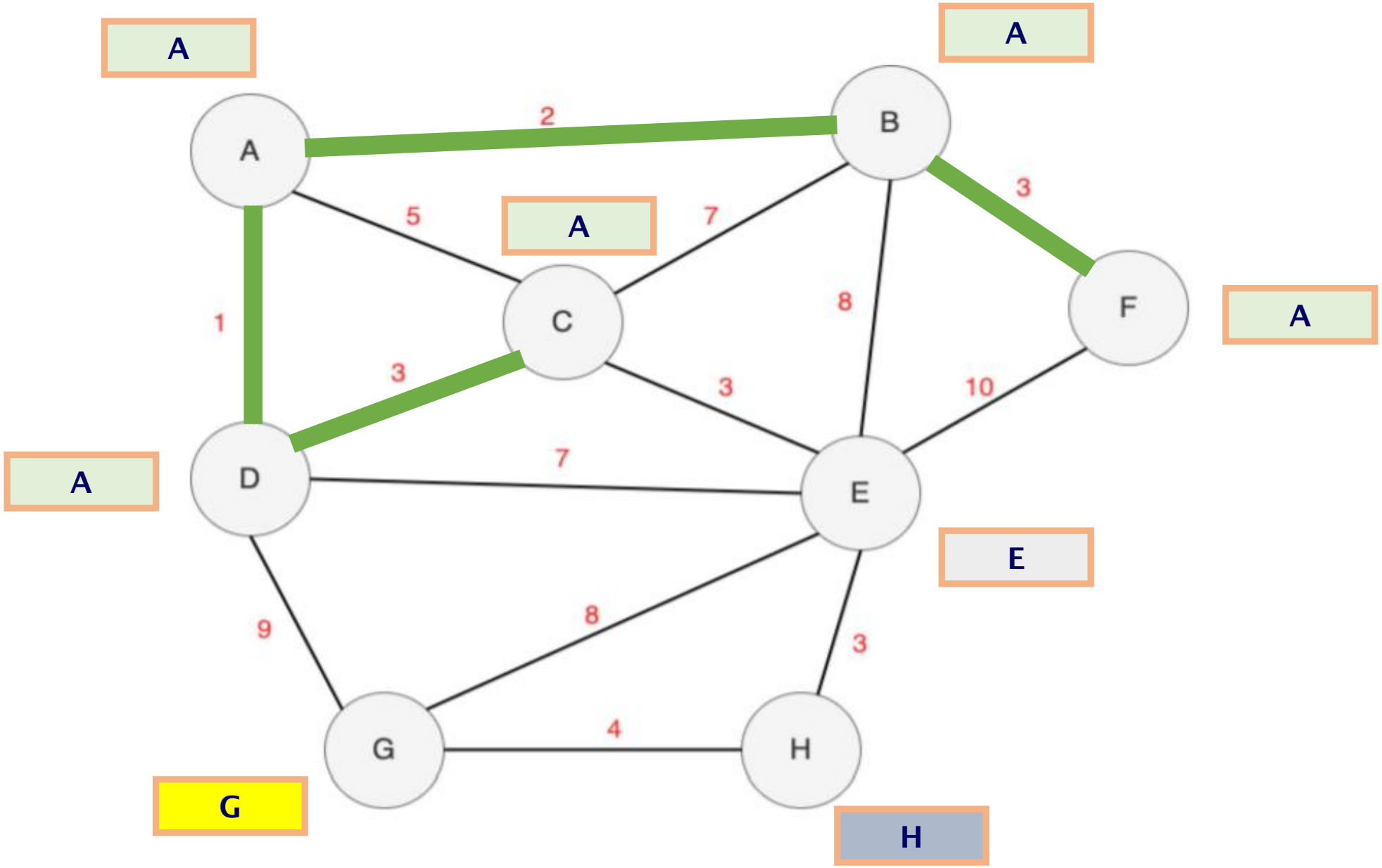
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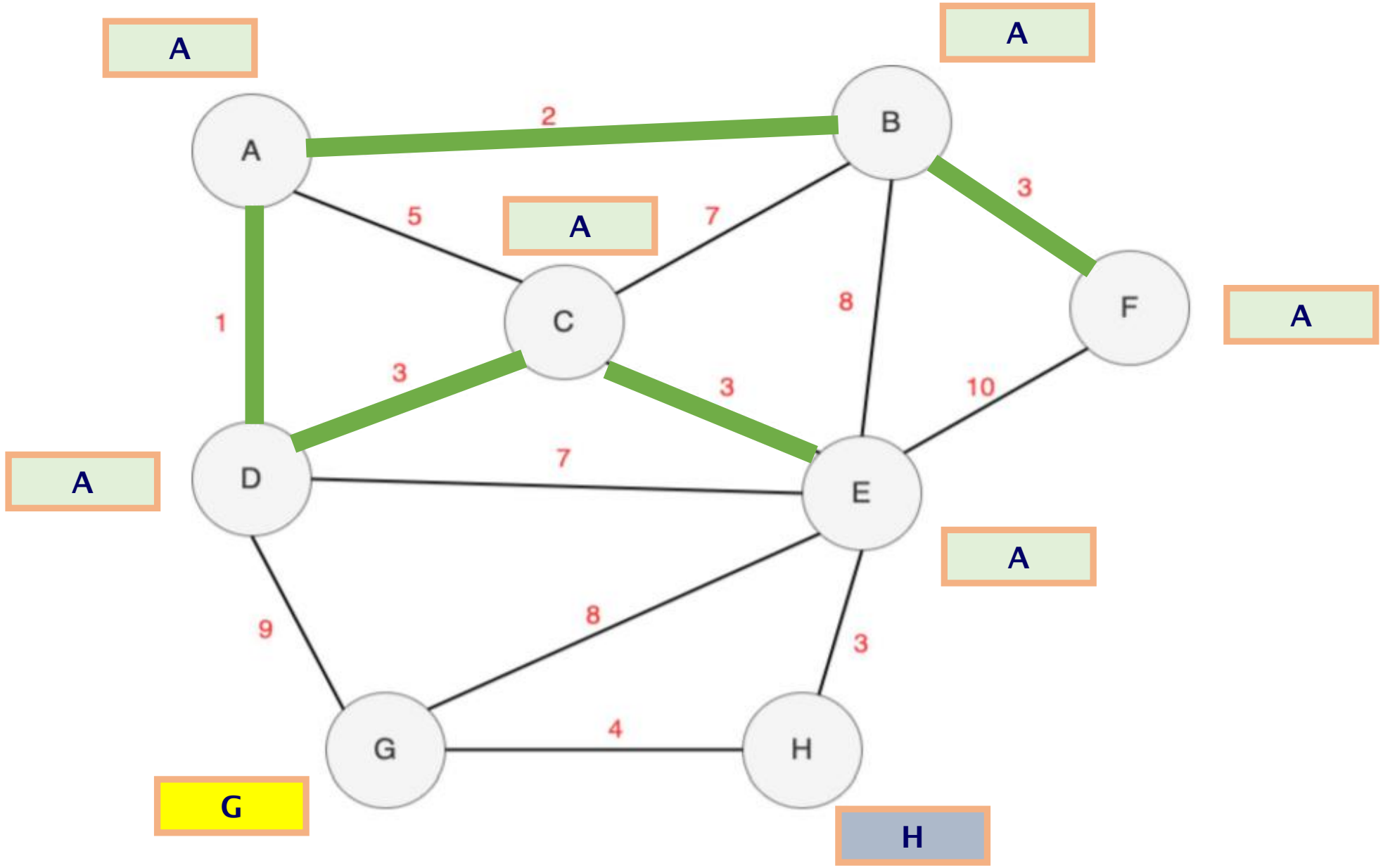
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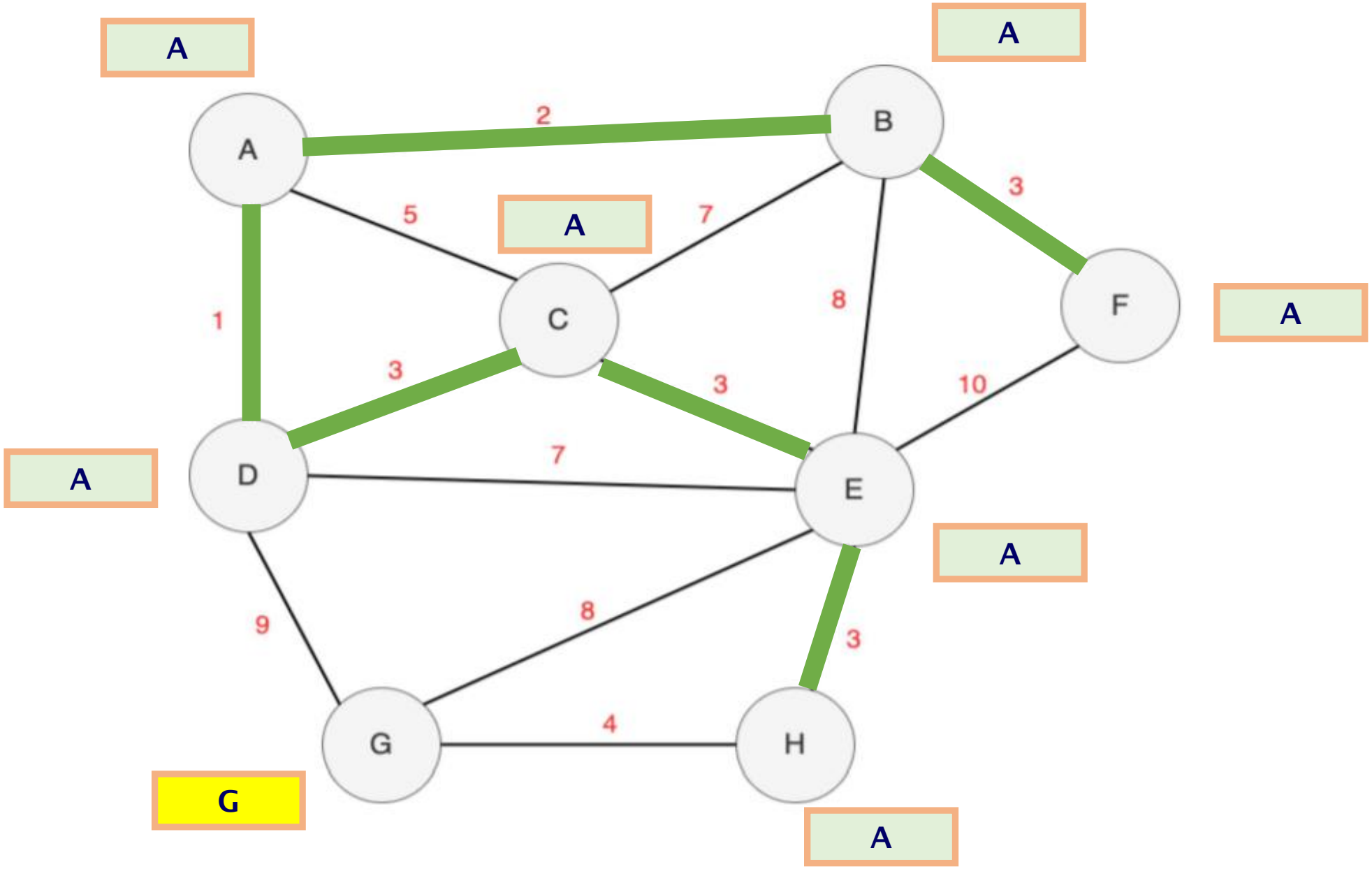
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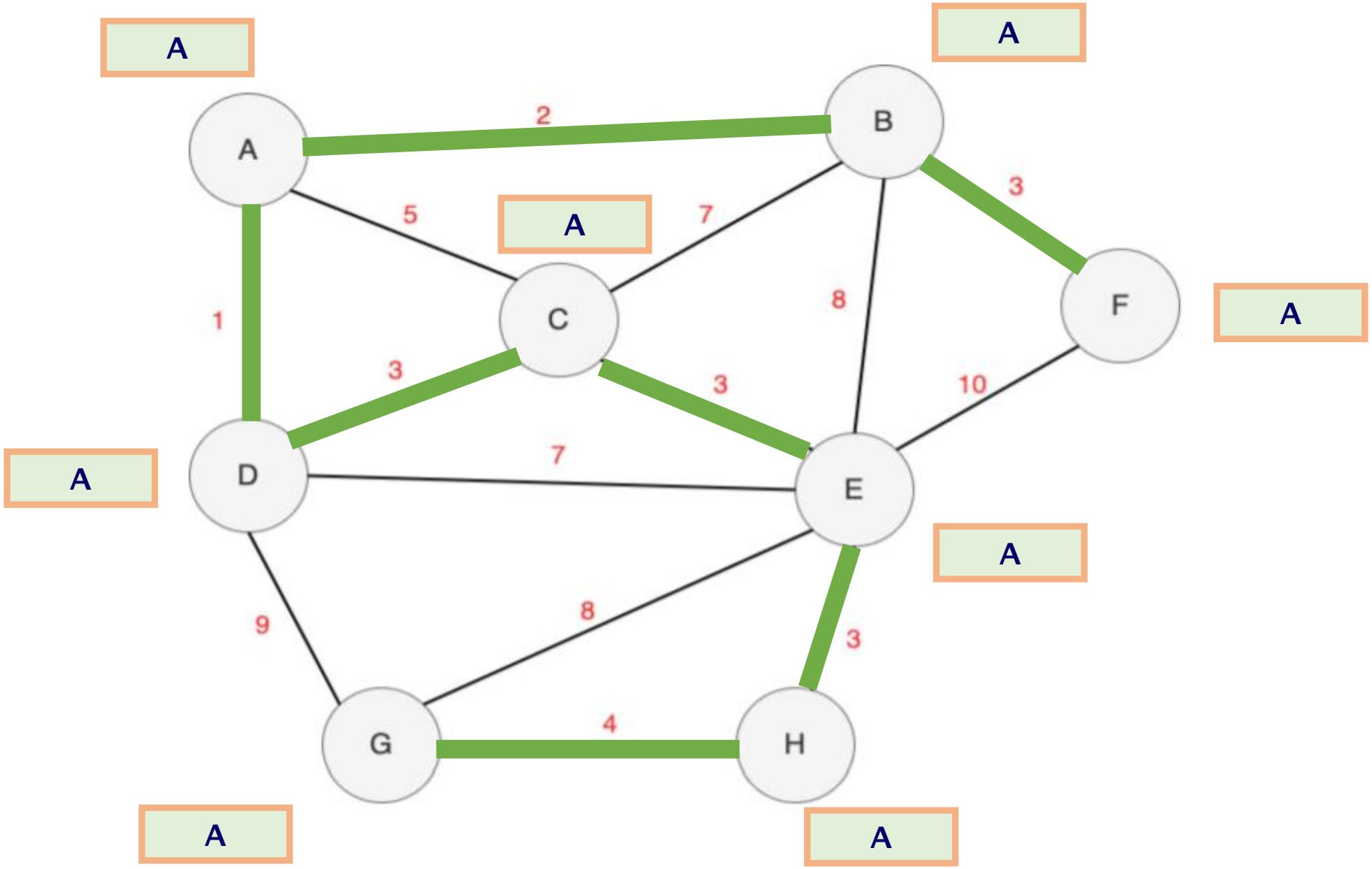
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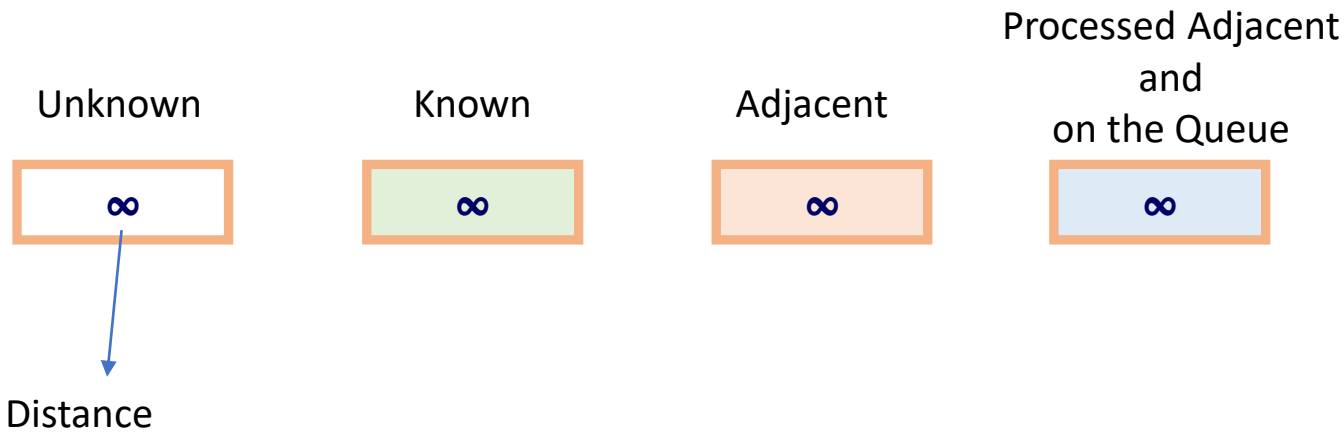
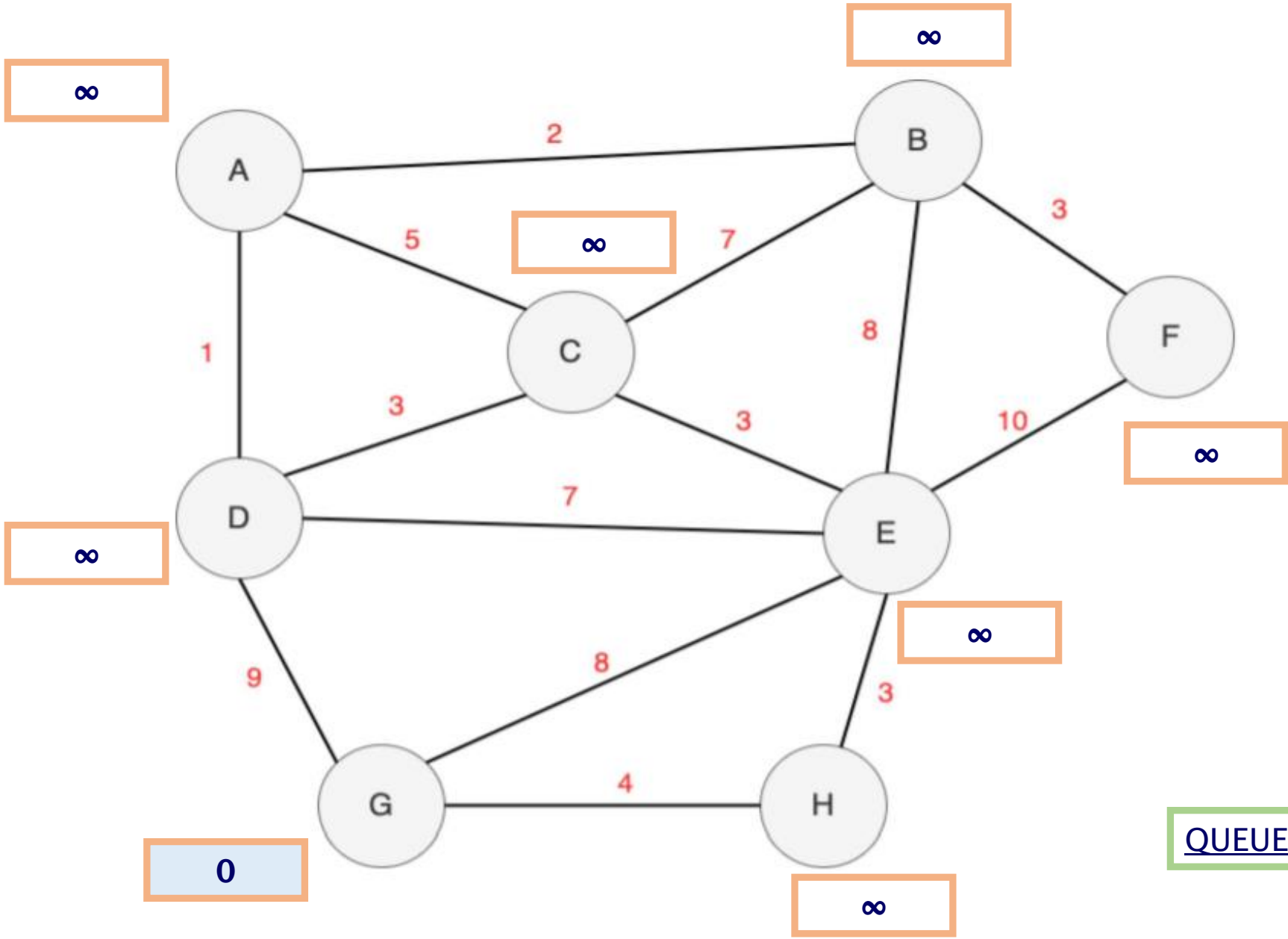
Question 4: Find shortest unweighted path from G to all other vertices for the graph in Figure 1. Use breadth-first search algorithm in your answer. Do NOT forget to show the trace.

Shapes:





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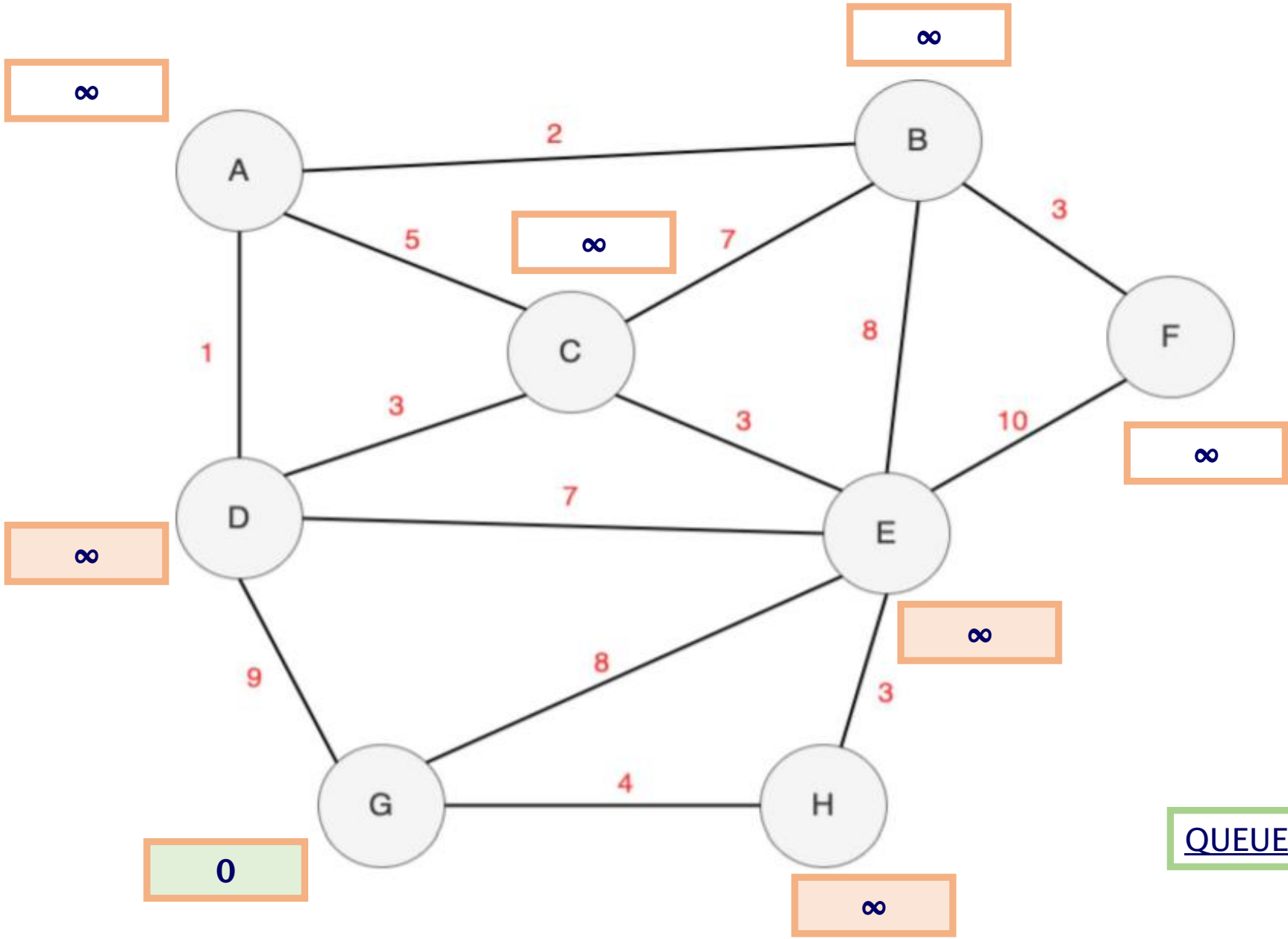

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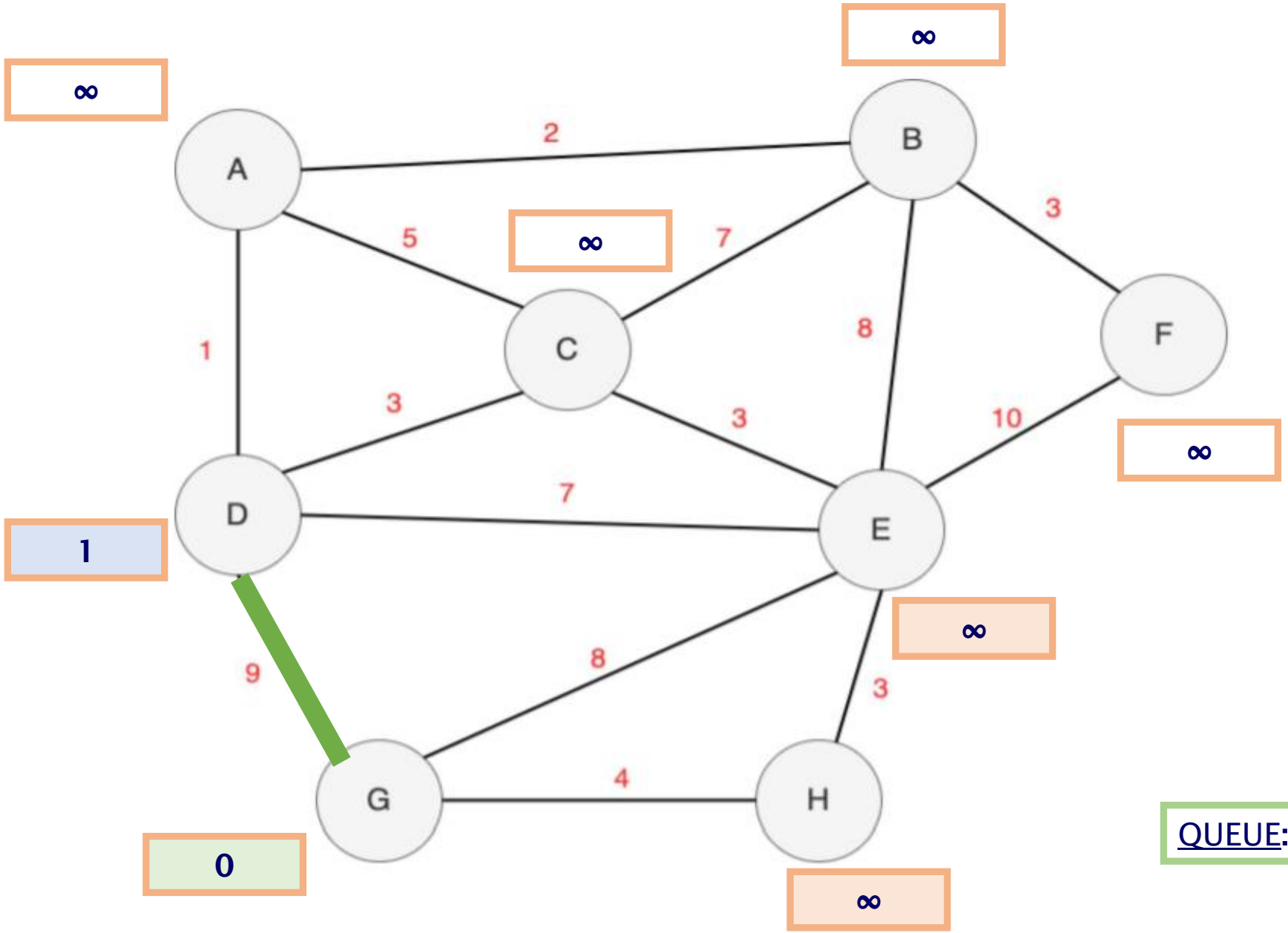
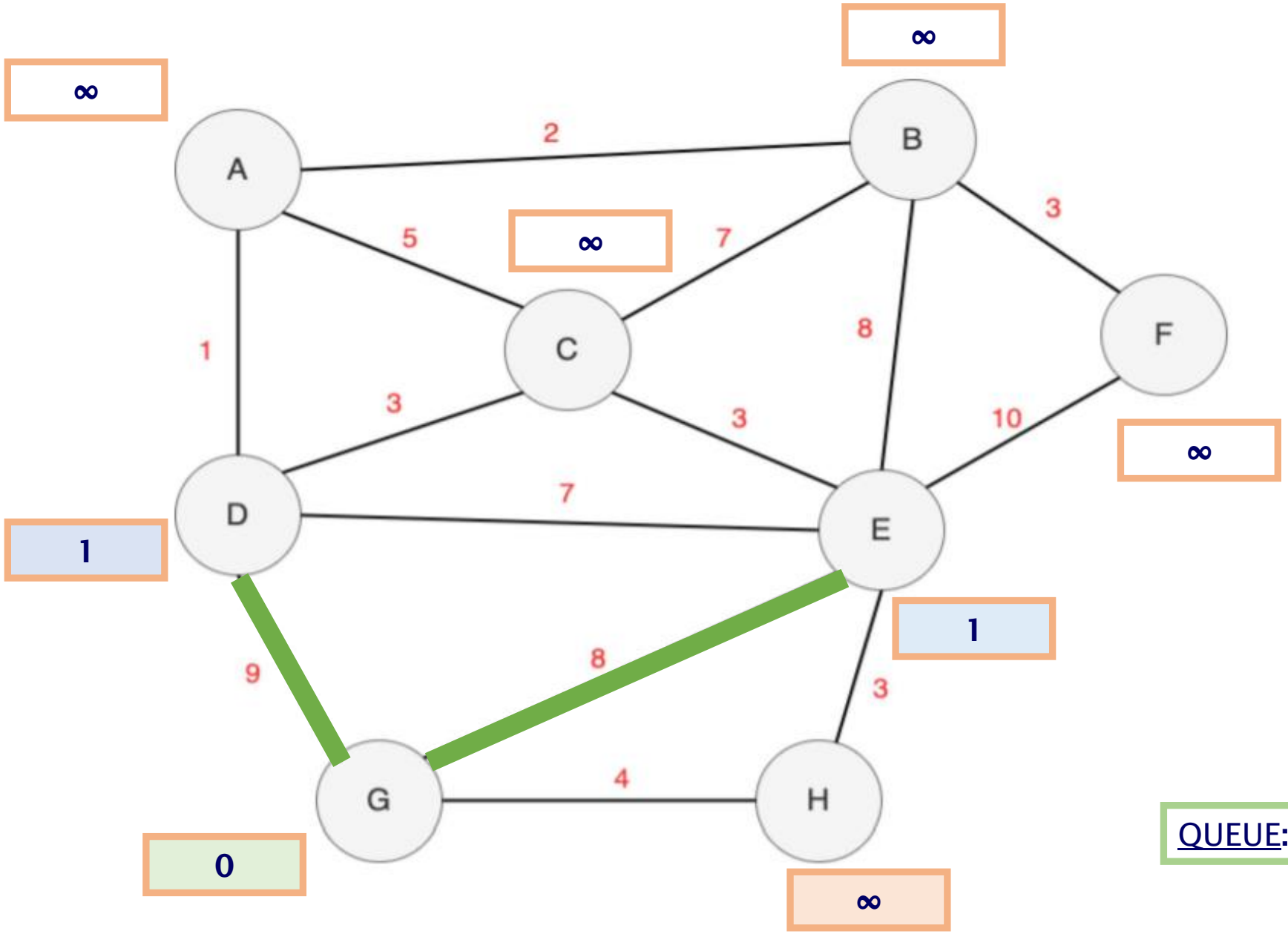
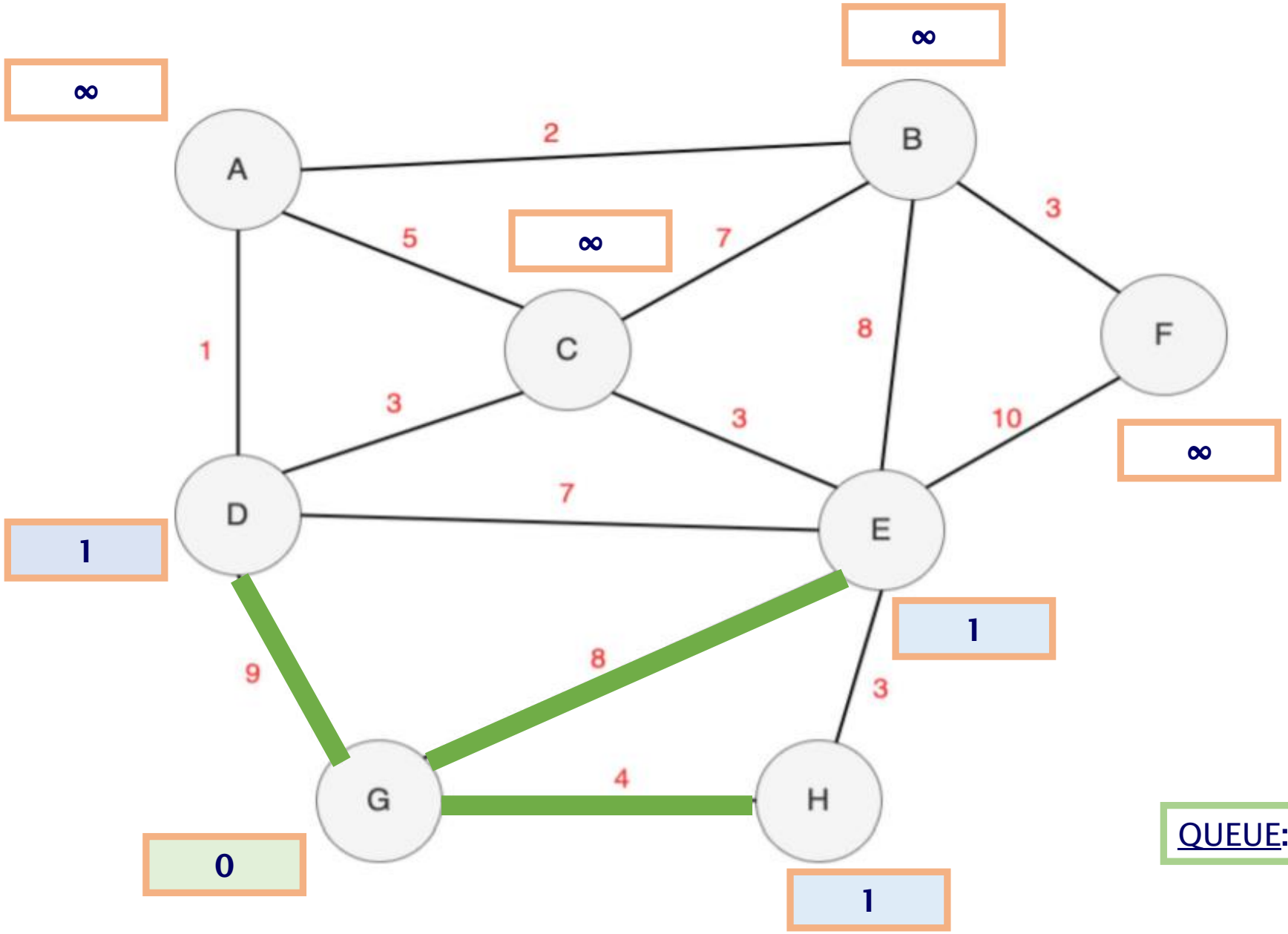


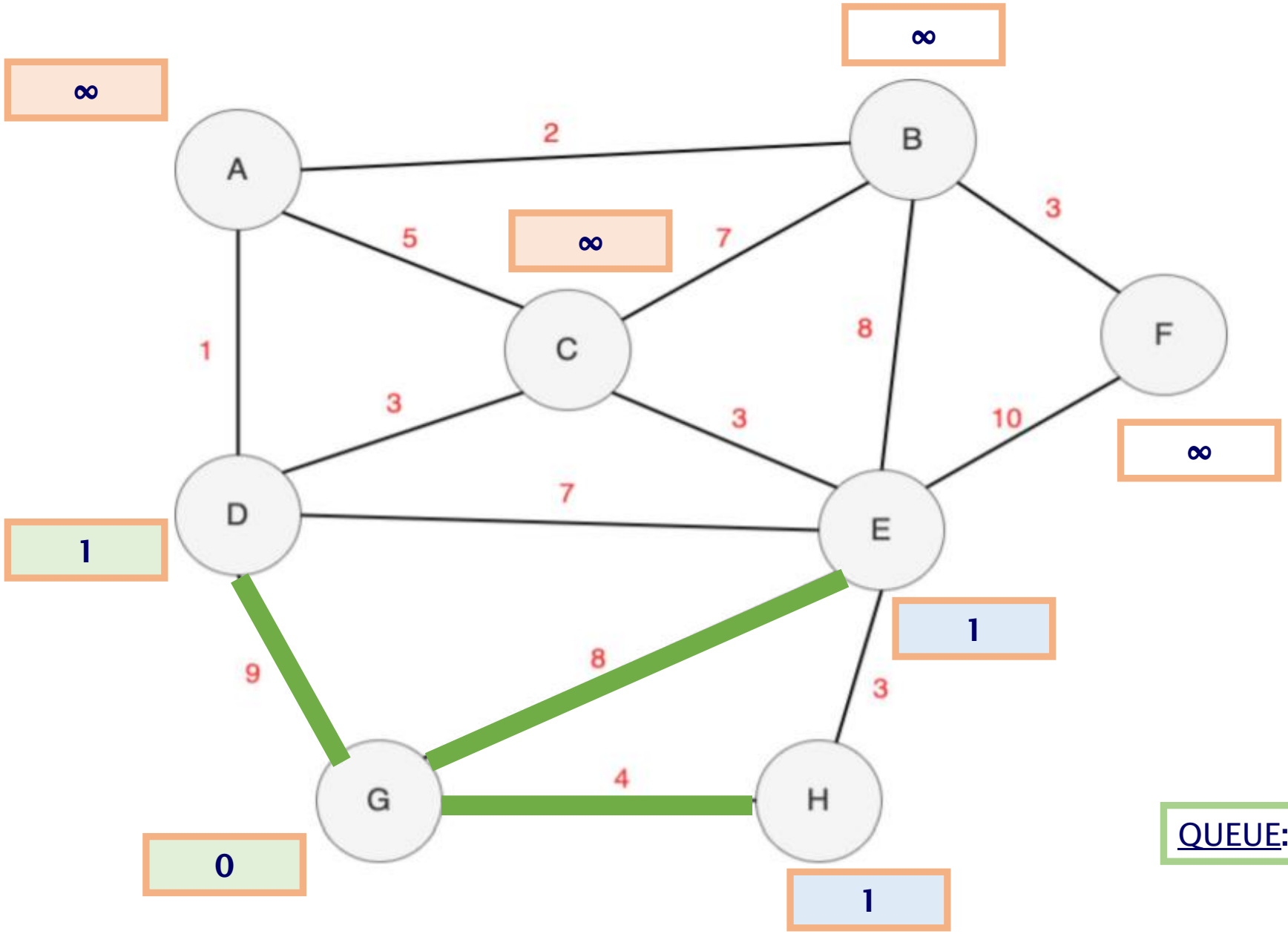
QUEUE: **D**



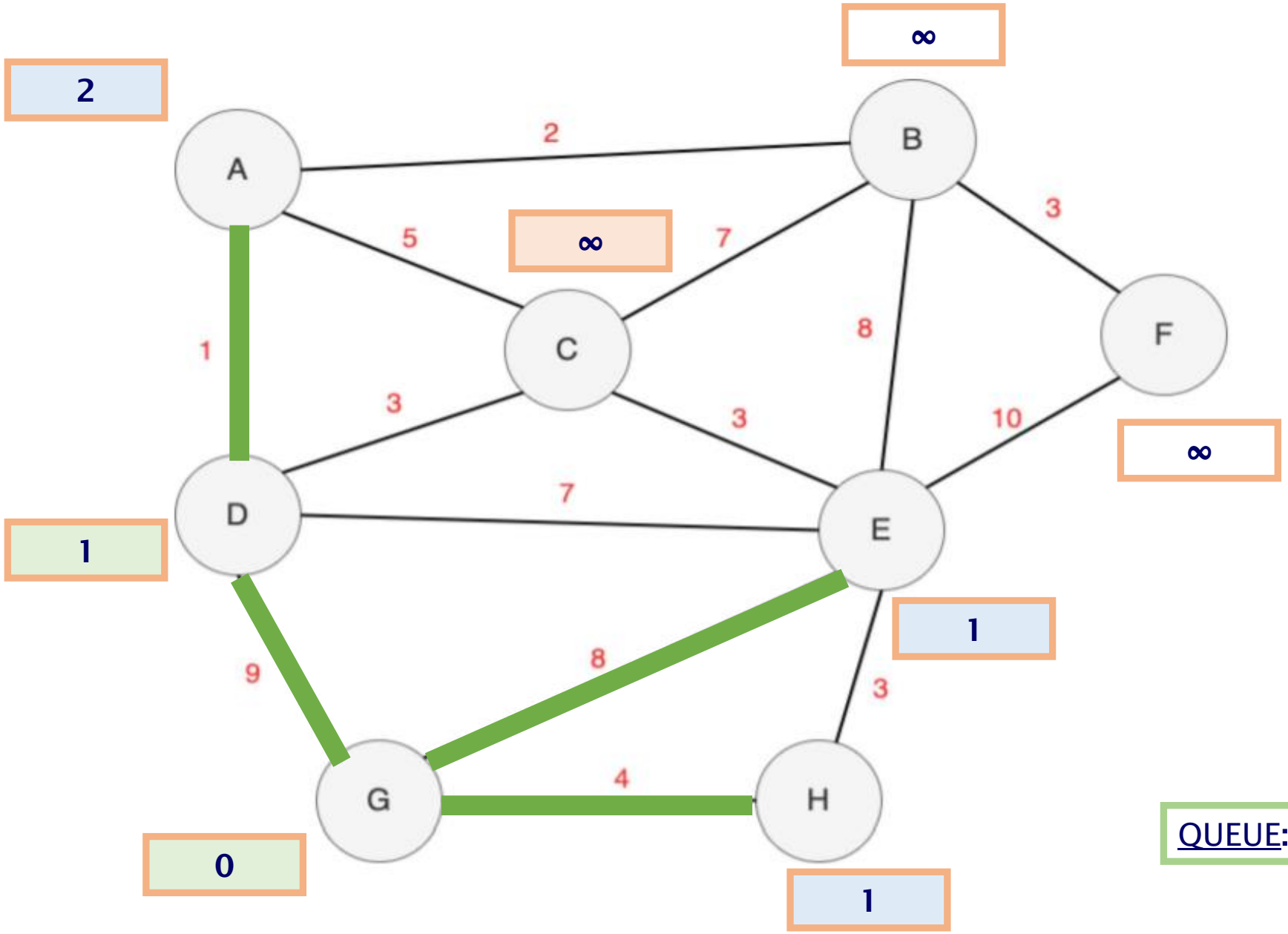
QUEUE: **D, E**



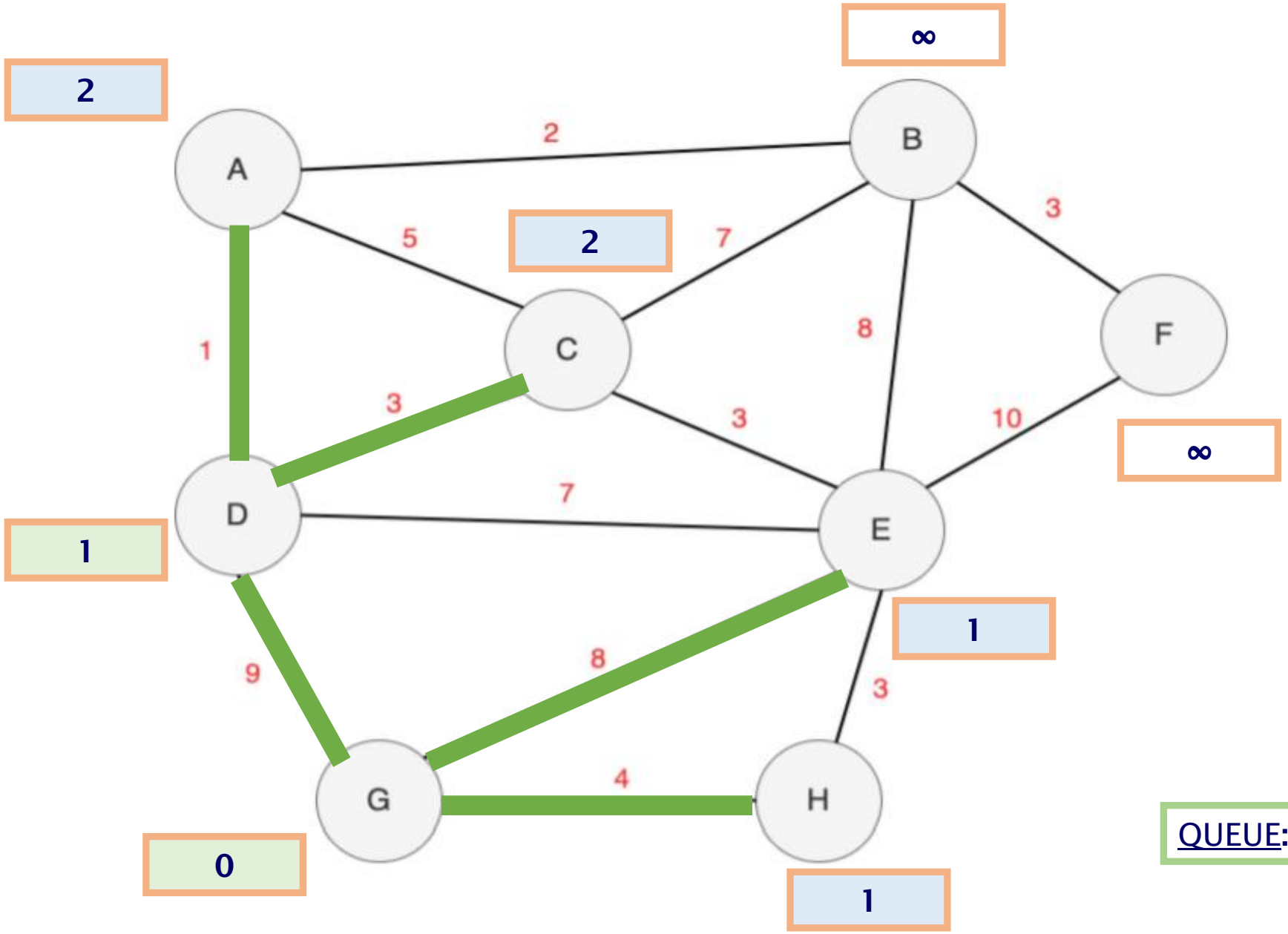
QUEUE: D, E, H



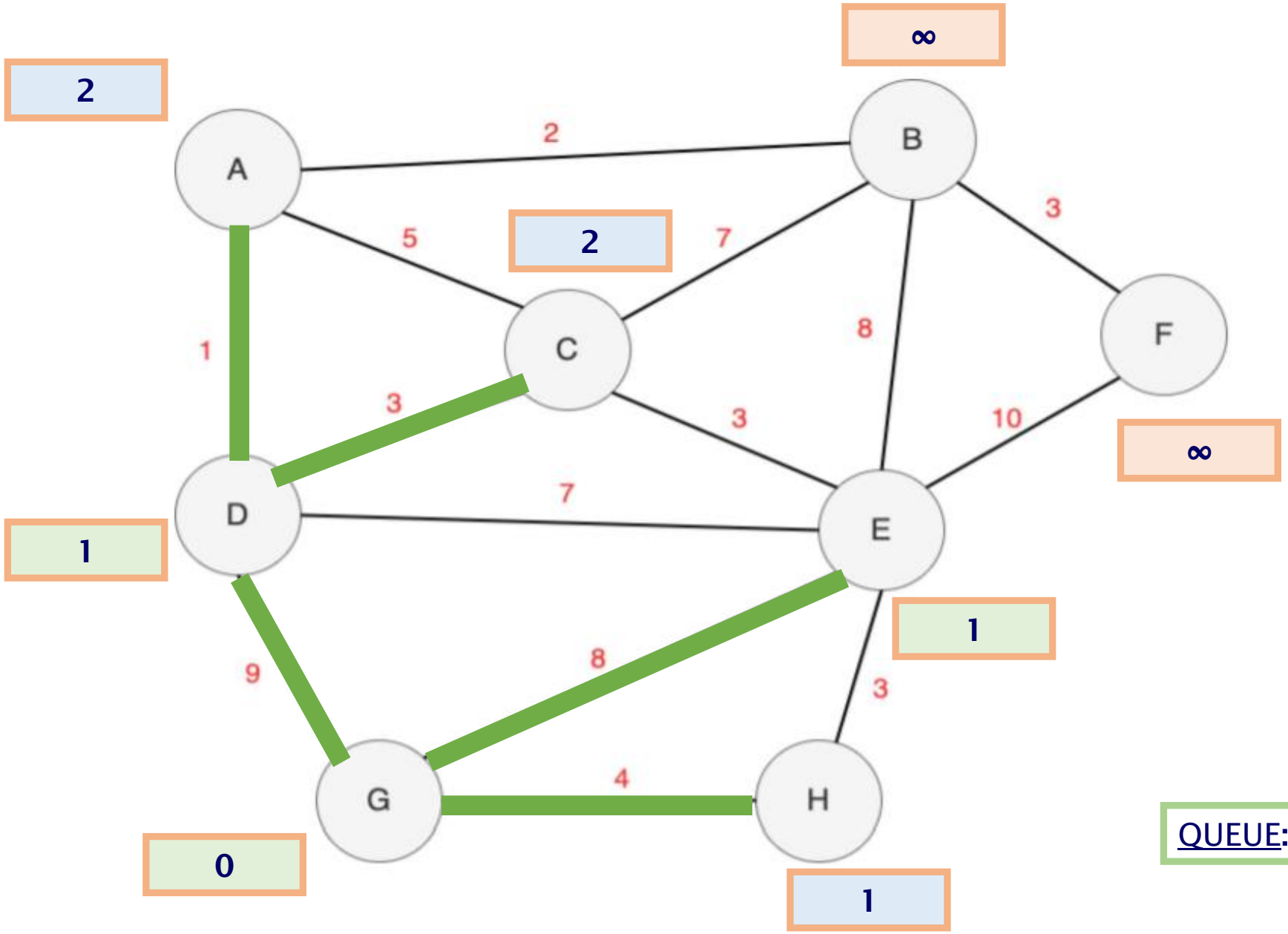
QUEUE: **E, H**



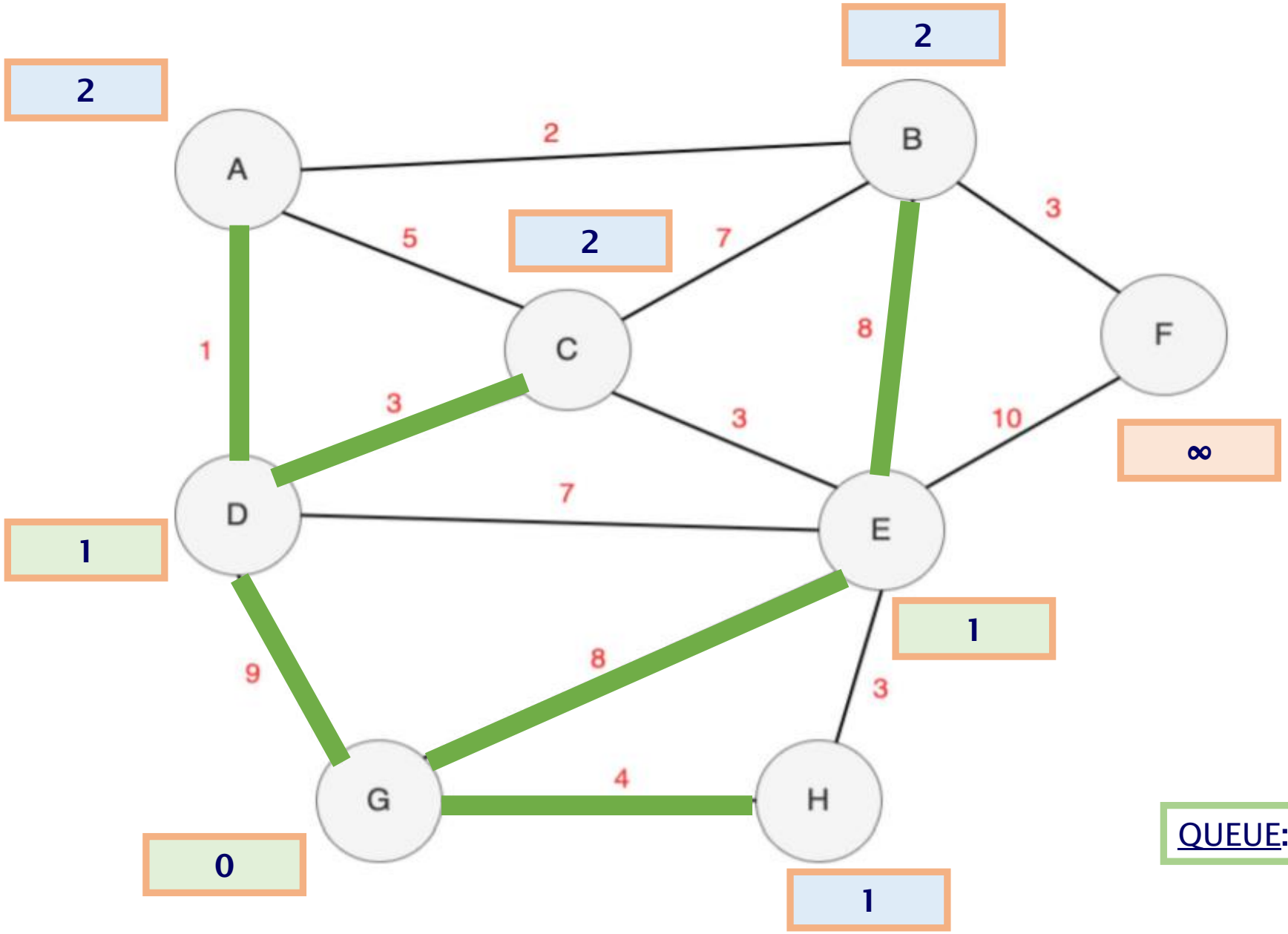
QUEUE: E, H, A



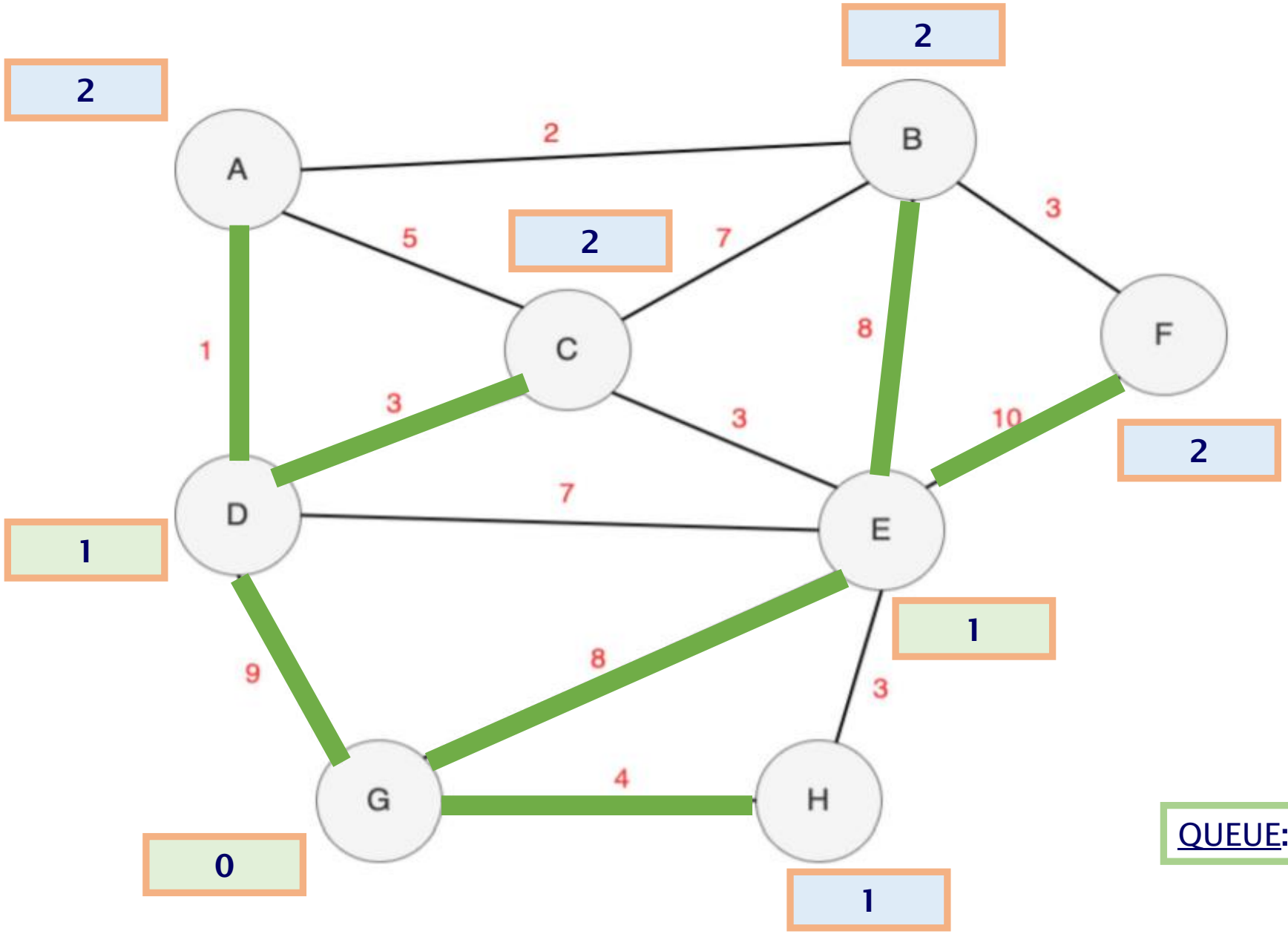
QUEUE: E, H, A, C



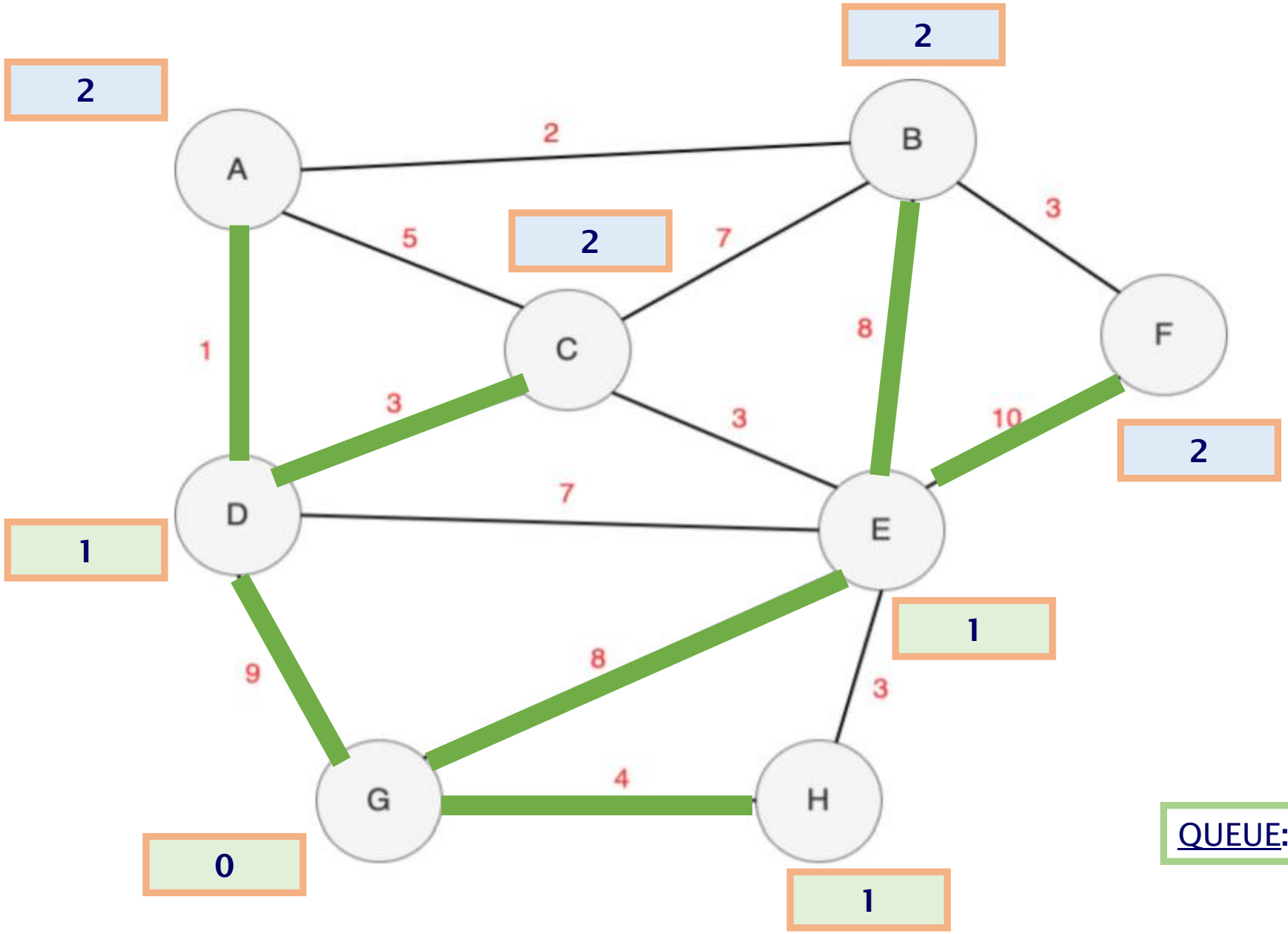
QUEUE: H, A, C



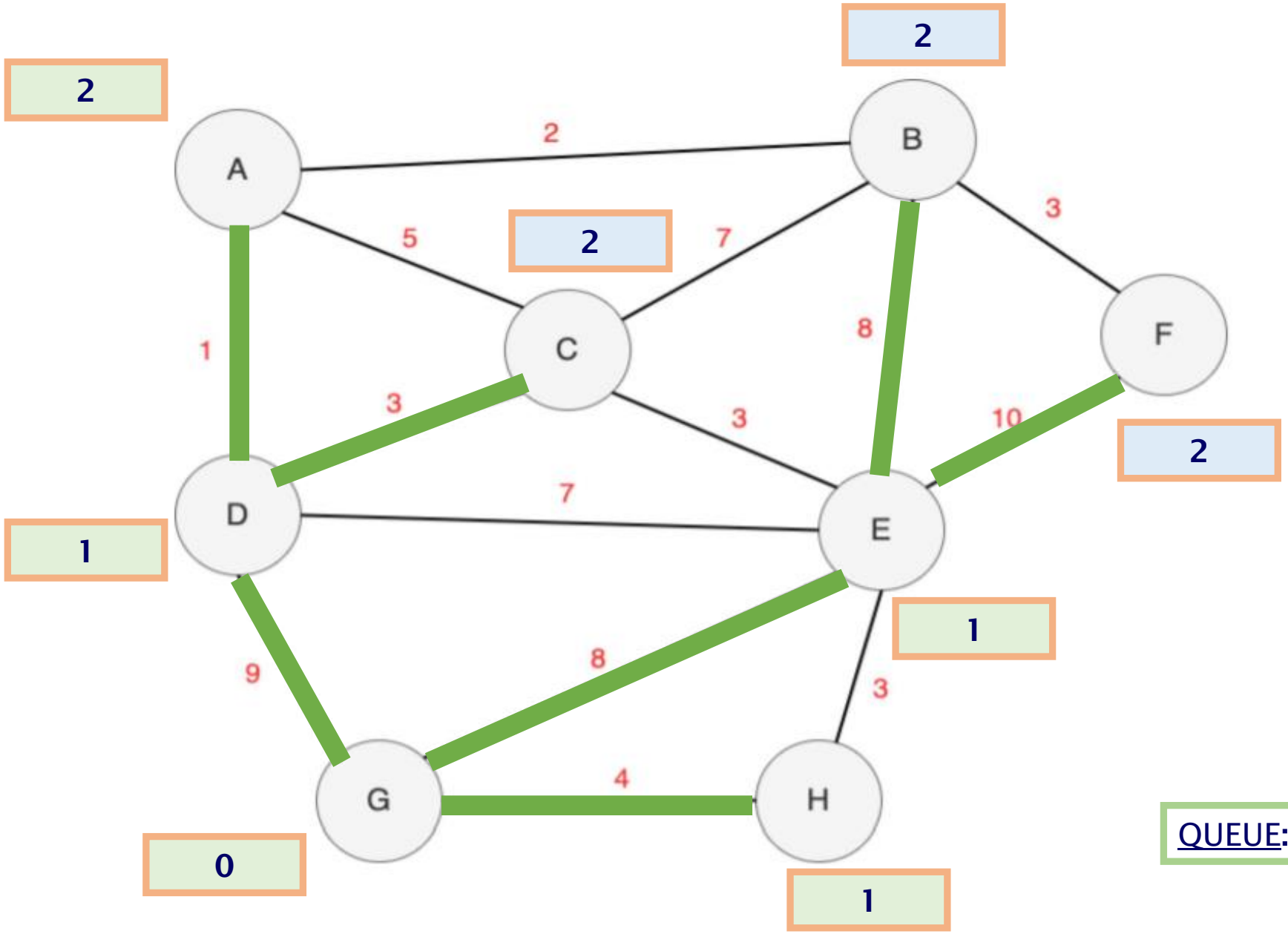
QUEUE: H, A, C, B



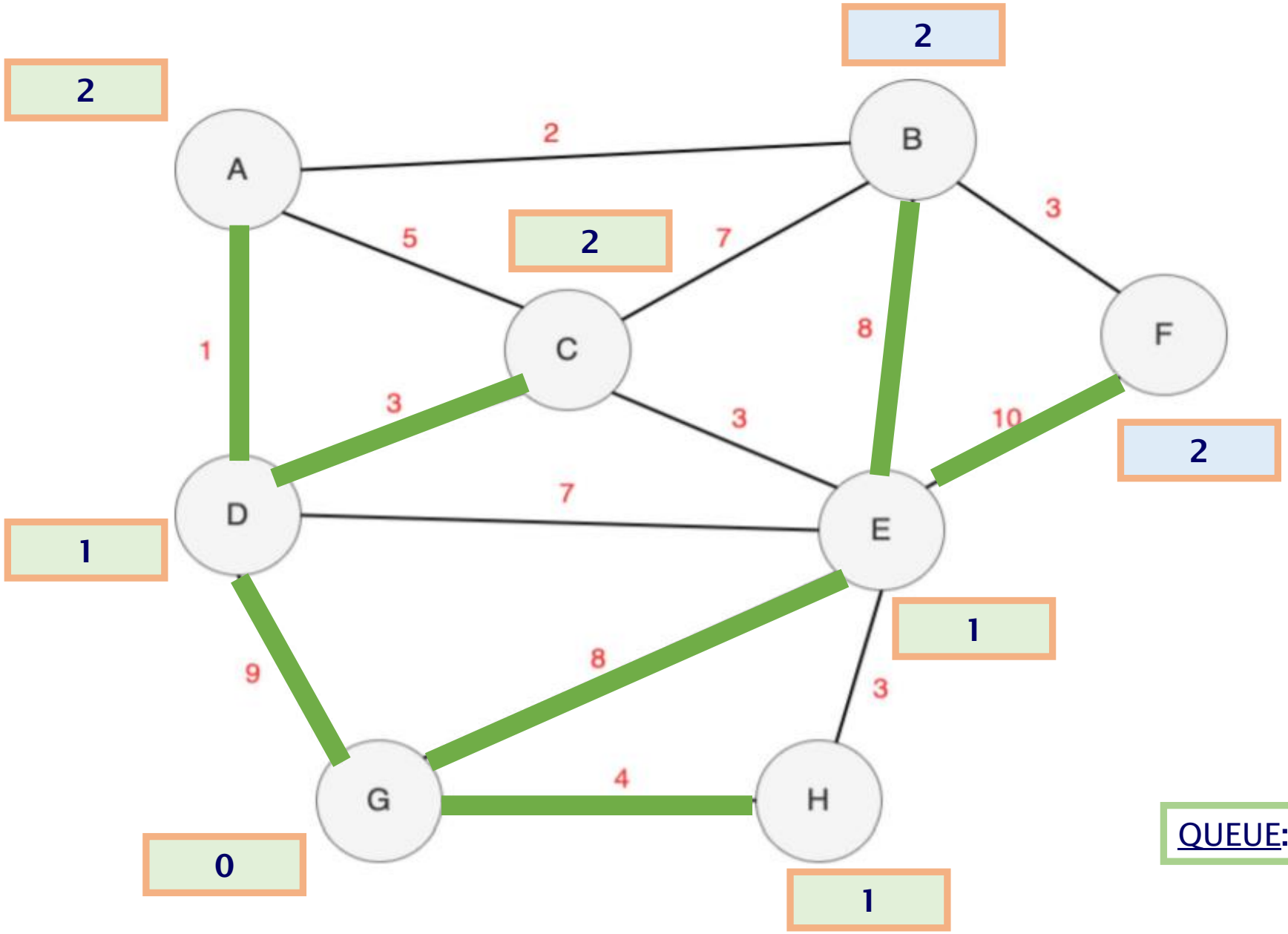
QUEUE: H, A, C, B, F



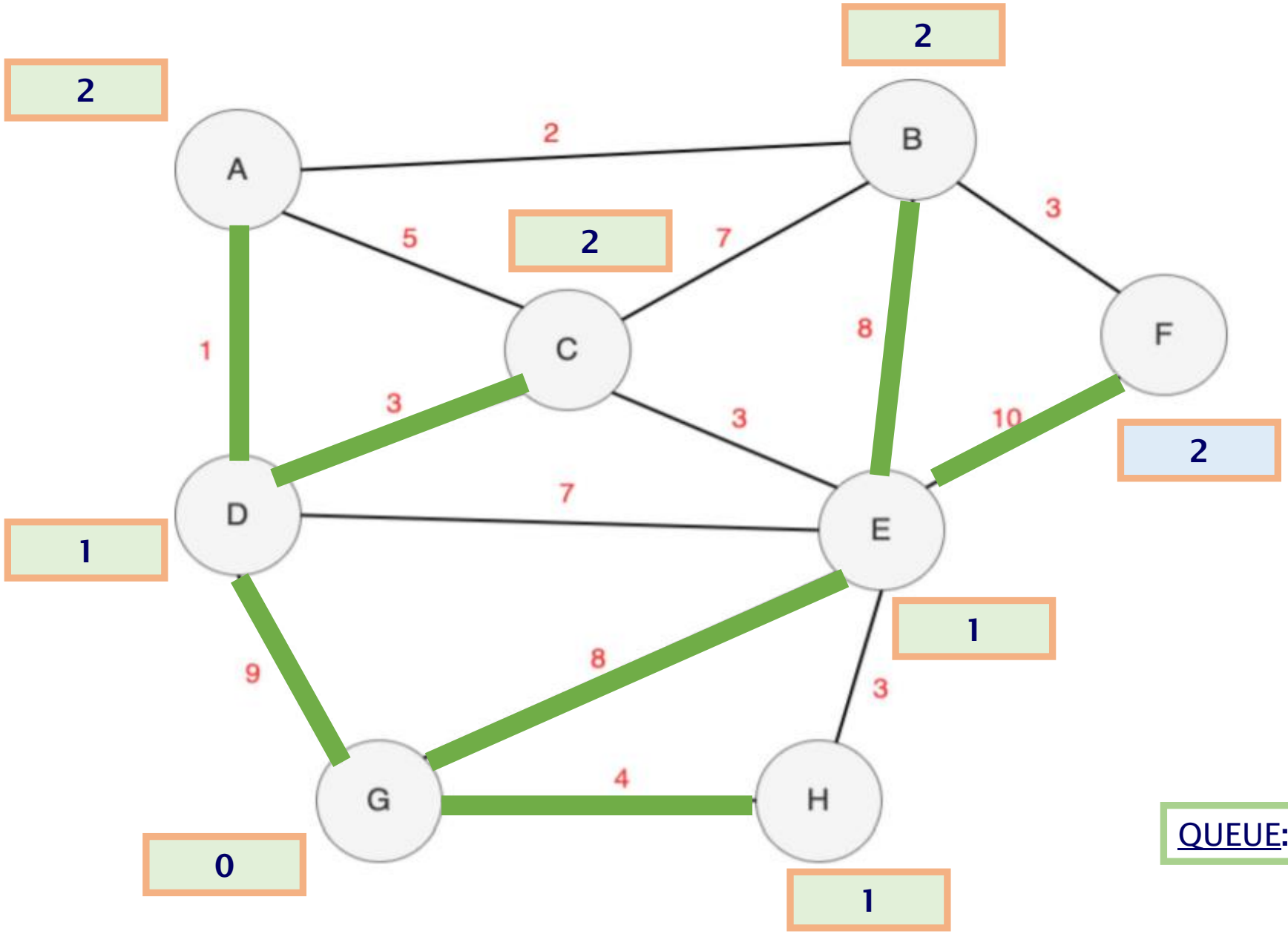
QUEUE: A, C, B, F



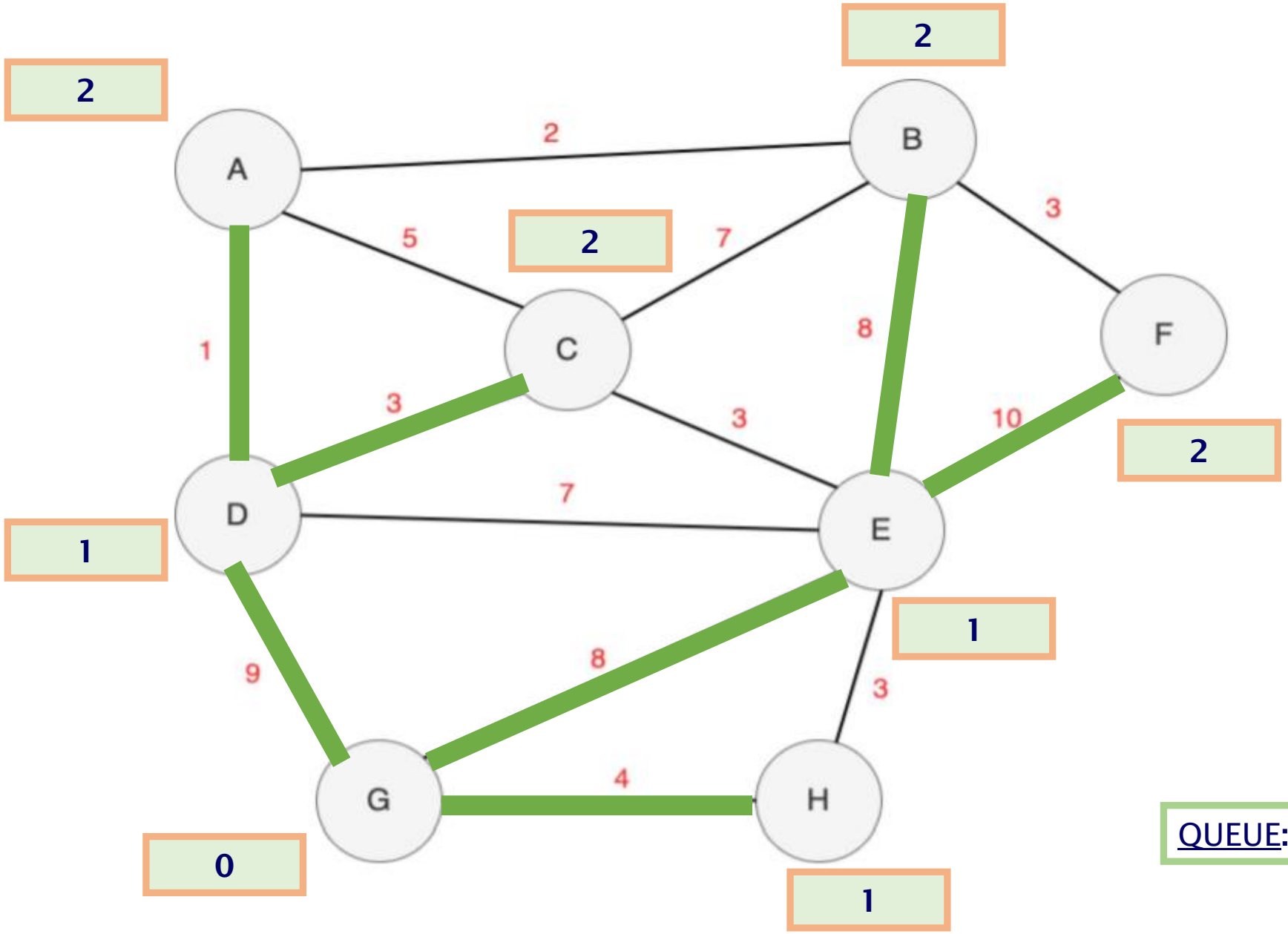
QUEUE: C, B, F



QUEUE: B, F

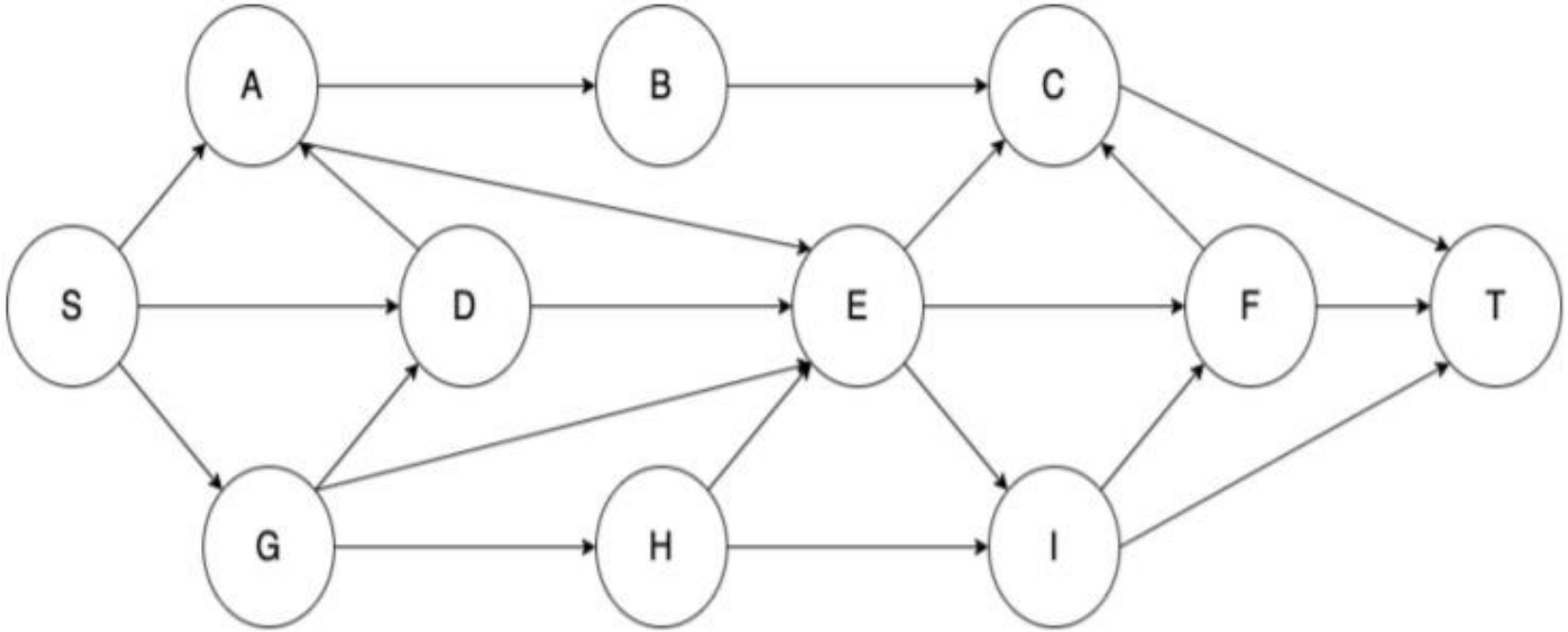


QUEUE: **F**



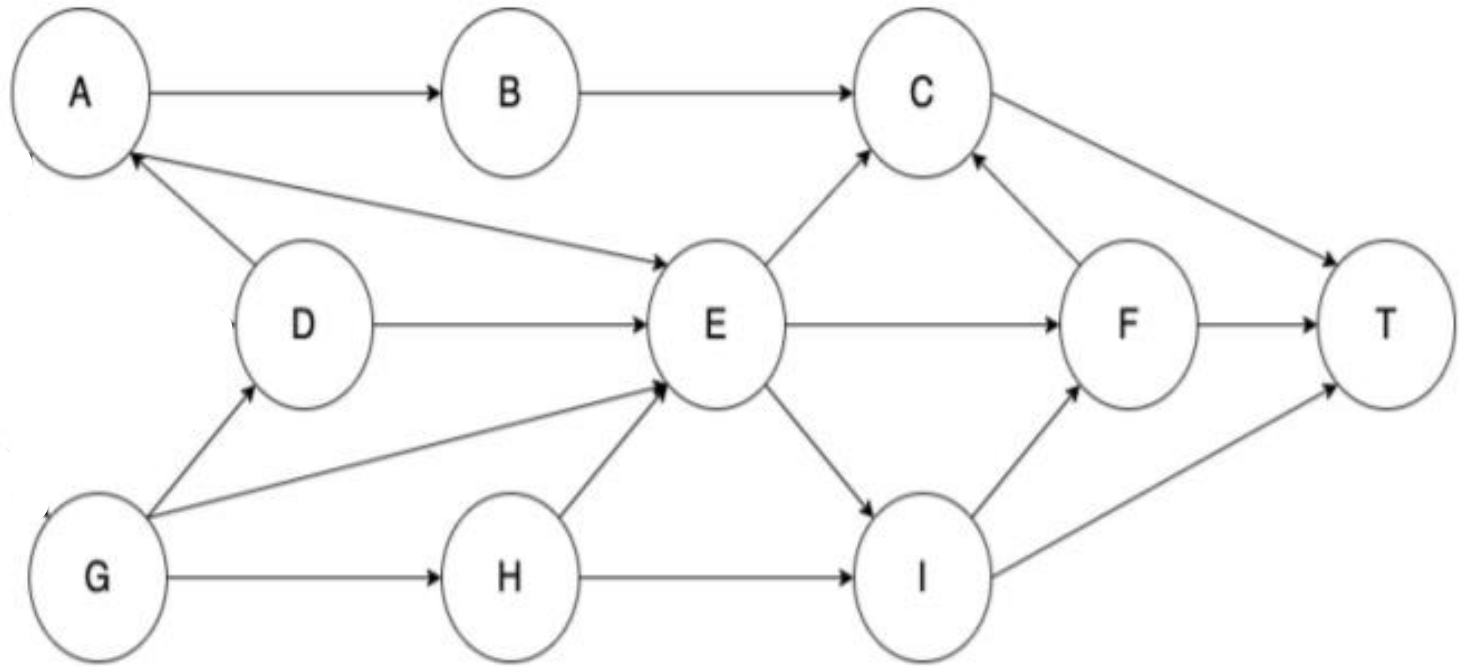
QUEUE:

Question 5: Find a topological ordering of the graph in Figure 2.



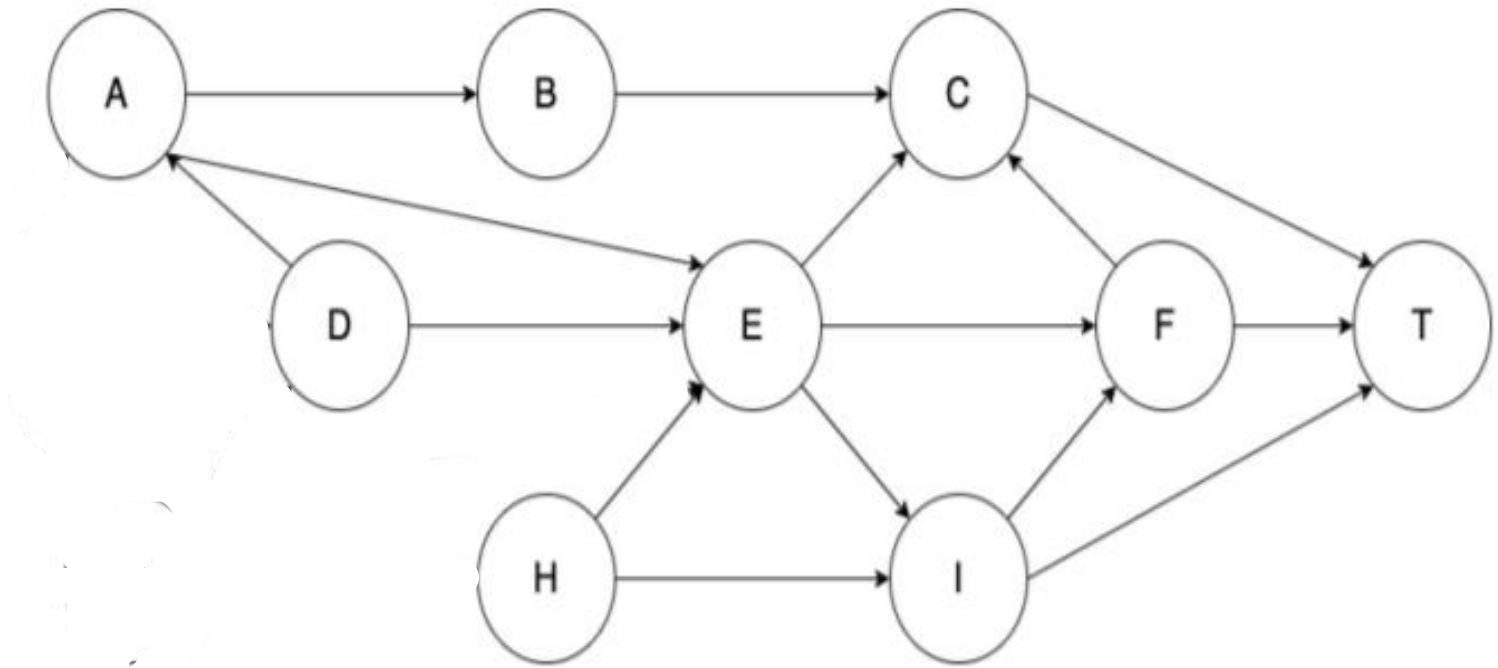
Order:

In-degree 0 Queue: S



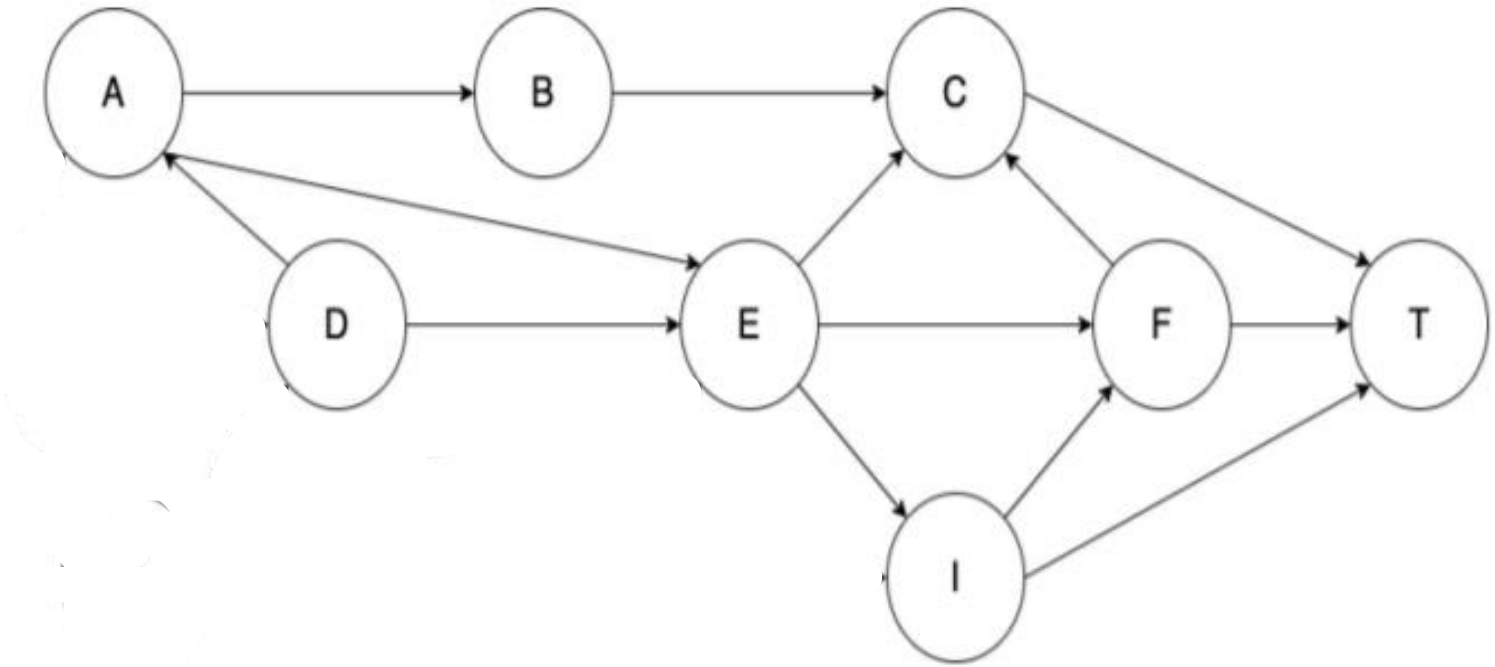
Order: S

In-degree 0 Queue: G



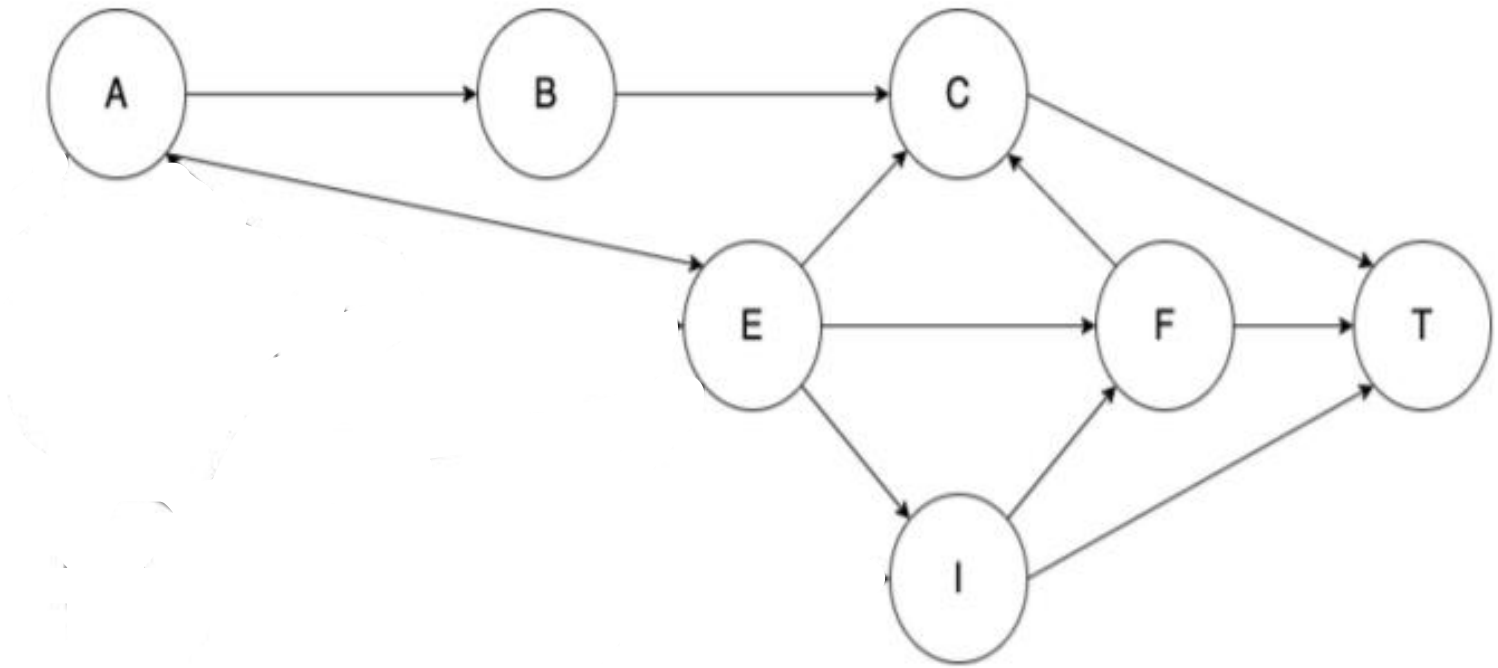
Order: S, G

In-degree 0 Queue: H, D



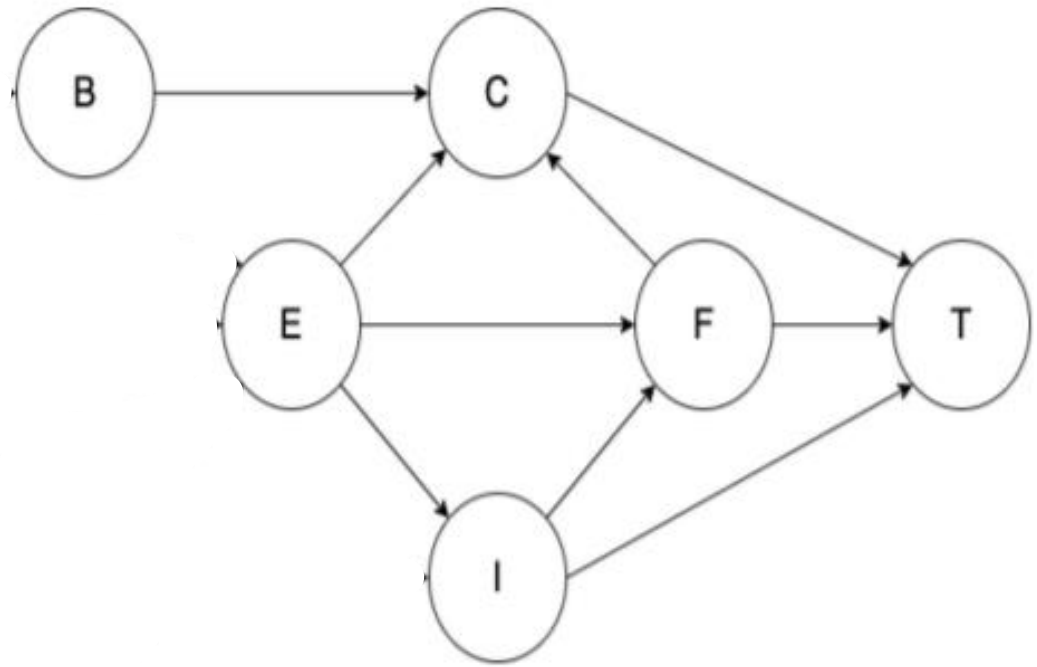
Order: S, G, H

In-degree 0 Queue: D



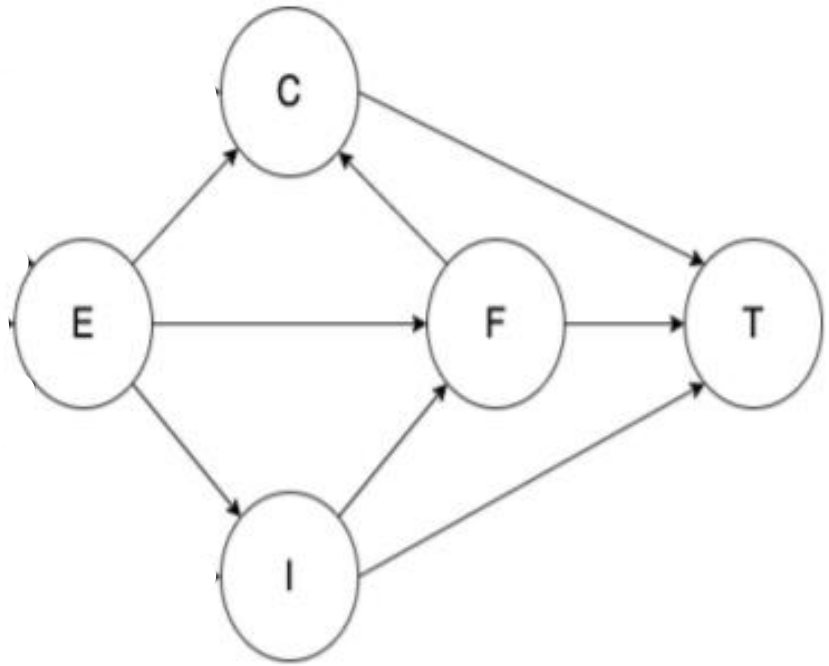
Order: S, G, H, D

In-degree 0 Queue: A



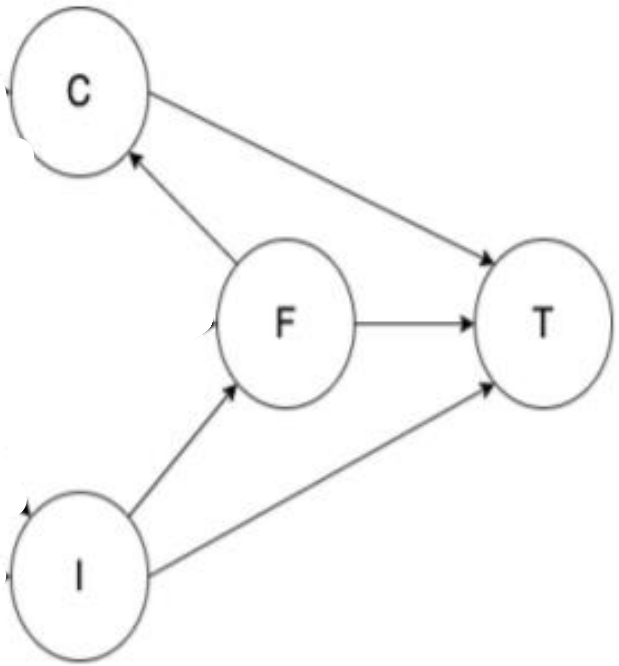
Order: S, G, H, D, A

In-degree 0 Queue: B, E



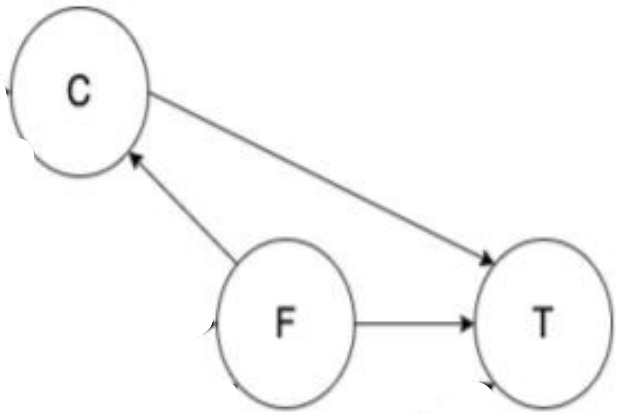
Order: S, G, H, D, A, B

In-degree 0 Queue: E



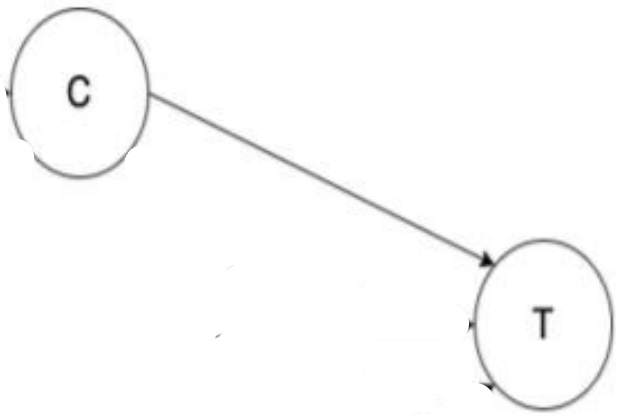
Order: S, G, H, D, A, B, E

In-degree 0 Queue: I



Order: S, G, H, D, A, B, E, I

In-degree 0 Queue: F



Order: S, G, H, D, A, B, E, I, F

In-degree 0 Queue: C

Order: S, G, H, D, A, B, E, I, F, C

In-degree 0 Queue: T

Order: S, G, H, D, A, B, E, I, F, C, T

In-degree 0 Queue: