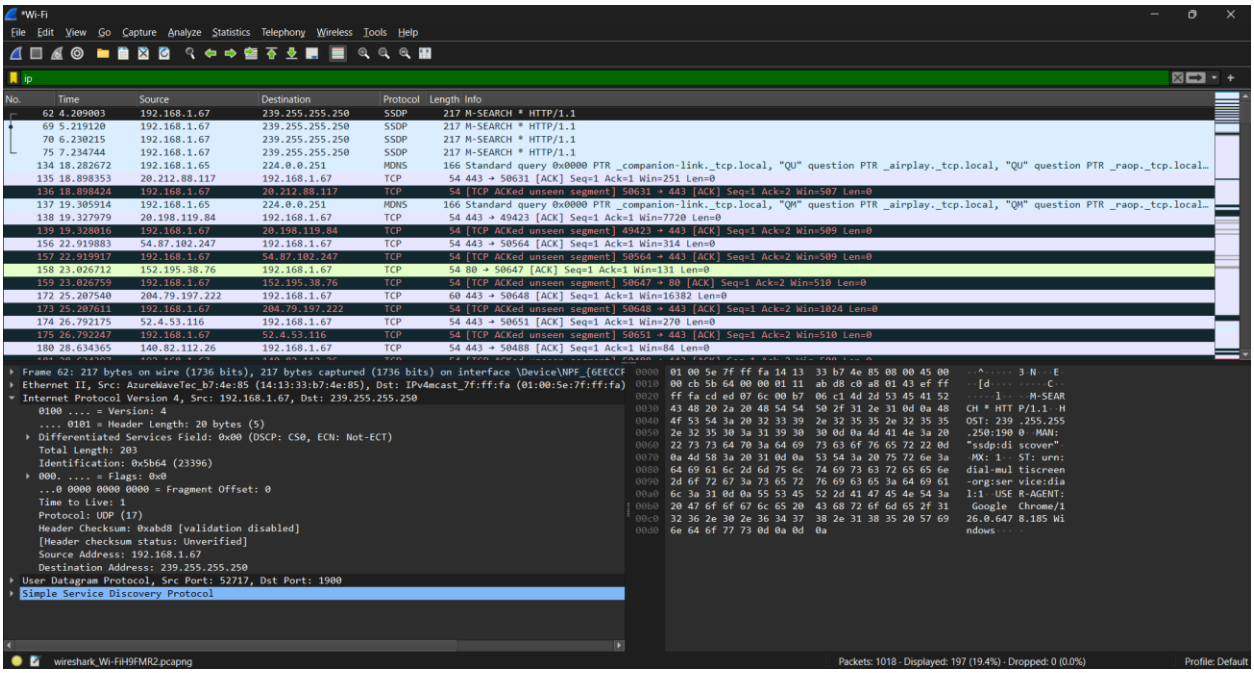
1) Capture an IP packet on Wireshark, what is the value of each of the header fields. Explain why the value is what it is.



Internet Protocol Version 4 (IPv4)

- **Version**: 4
  - This indicates that the packet is using IPv4.
- **Header Length**: 20 bytes (0101)
  - The length of the header is (5 * 4) 20 bytes .
- **Differentiated Services Field**: 0x00 (DSCP: CS0, Not-ECT)
  - Default DSCP value, indicating best-effort service.
- **Total Length**: 203
  - The total length of the IP packet, including header and data, is 203 bytes.
- **Identification**: 0x5b64 (23396)
  - Unique identifier for the packet used in reassembly of fragmented packets.
- **Flags**: 0x0 (Don't fragment)
  - Indicates fragmentation control. 0x0 means no fragmentation.
- **Fragment Offset**: 0
  - The position of the fragment in the original packet. 0 indicates it's not fragmented.
- **Time to Live (TTL)**: 1
  - The packet can only make 1 more hop before being discarded. Often set low for multicast packets.
- **Protocol**: UDP (17)

    - The encapsulated protocol is UDP.
- **Header Checksum**: 0xabd8 (validation disabled)
    - Used for error-checking the header.
- **Source Address**: 192.168.1.67
    - The IP address of the device sending the packet.
- **Destination Address**: 239.255.255.250
    - The IP address of the device receiving the packet.

2) On Leetcode, find a problem that can be solved with Dijkstra's Algorithm.

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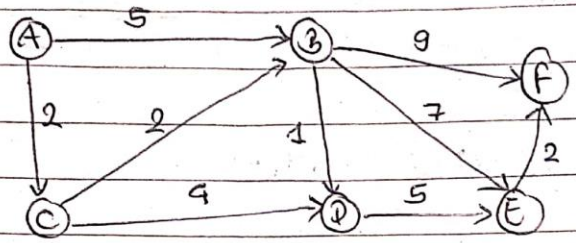
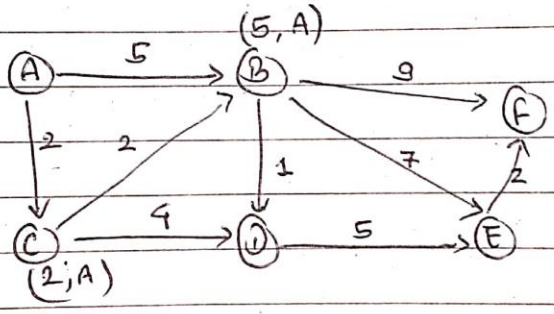
(#) Dijkstra Algorithm :

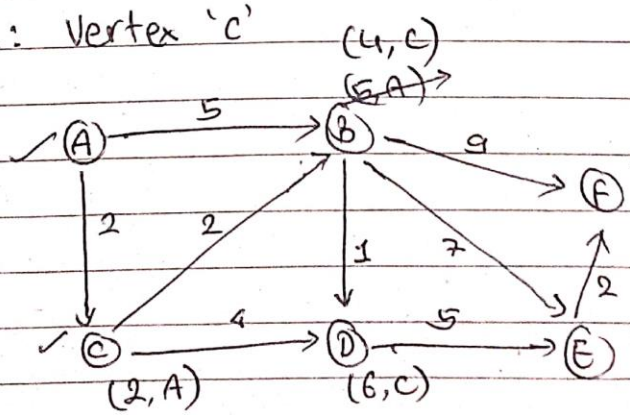
(Shortest path betn vertex (A) & (F))



Step 1: Lets start with vertex ~~'A'~~ 'A'.



Step 2: Vertex 'C'



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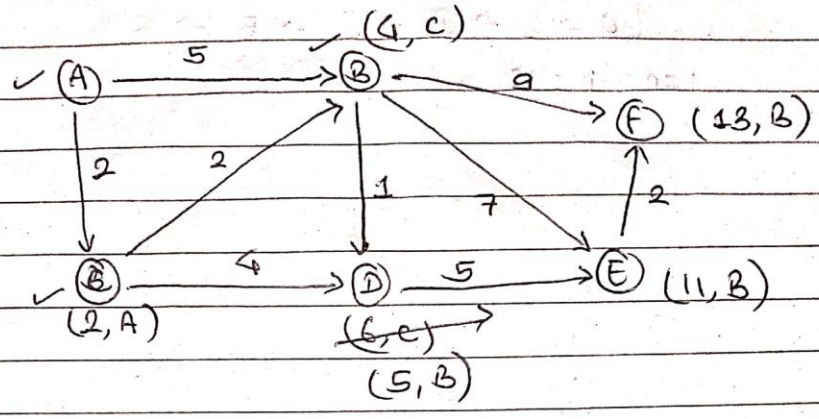
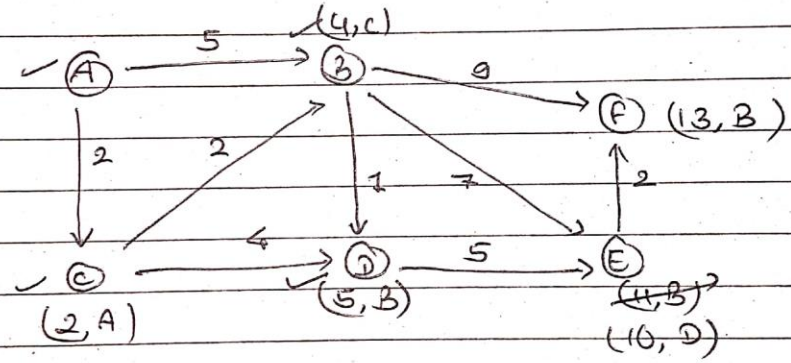
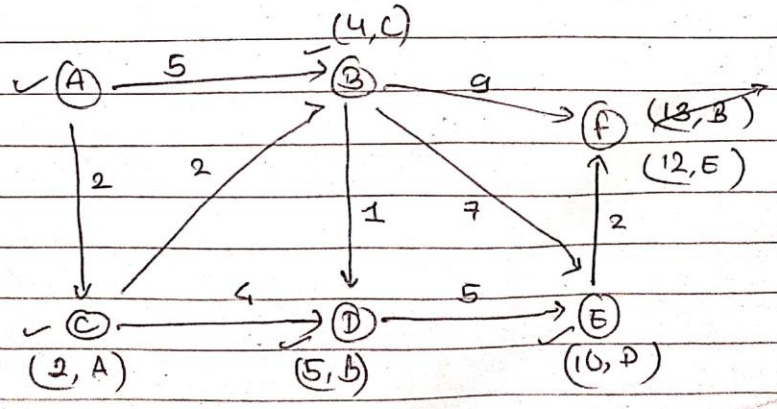
Step 3: Vertex 'B'

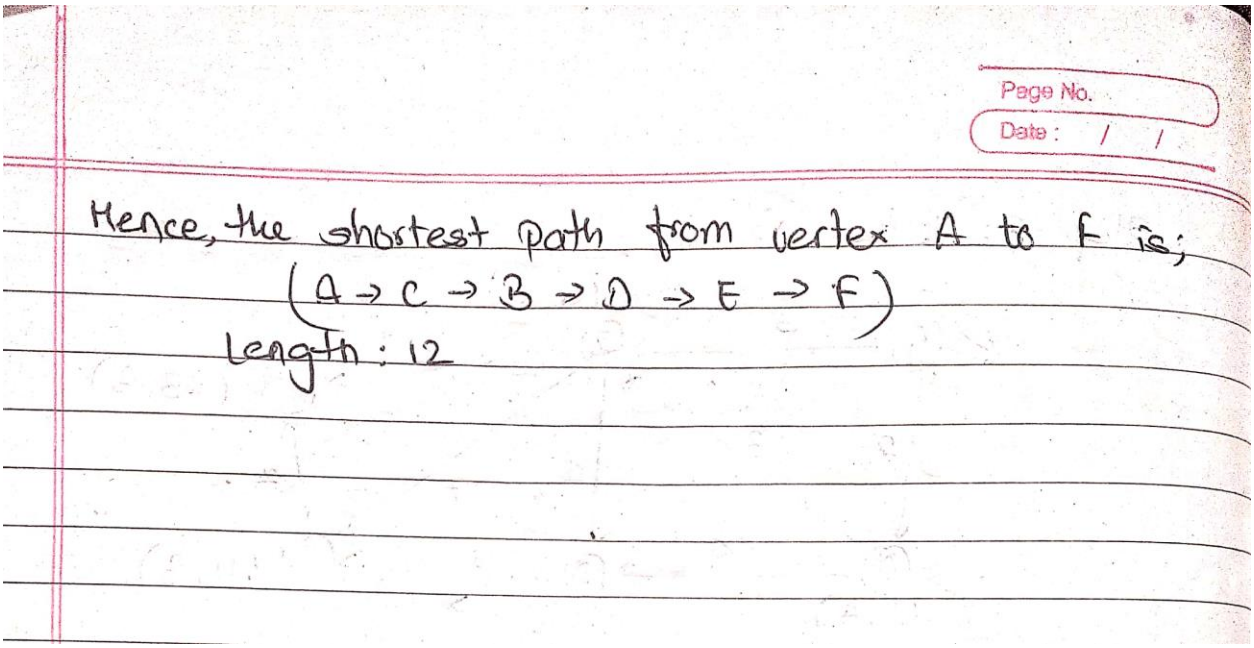


Step 4: Vertex 'D'



Step 5: Vertex 'E'





3) On Leetcode, find a problem that can be solved with Bellman-Ford Algorithm and solve it.

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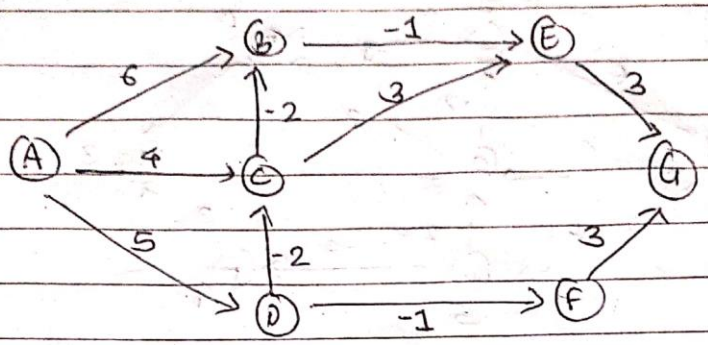
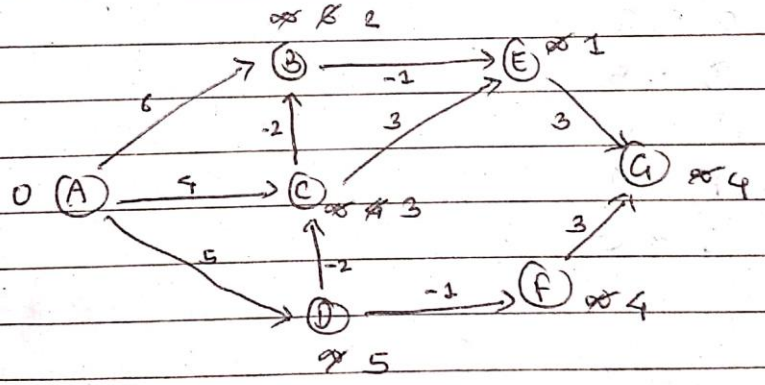
Bellman-ford Algorithm

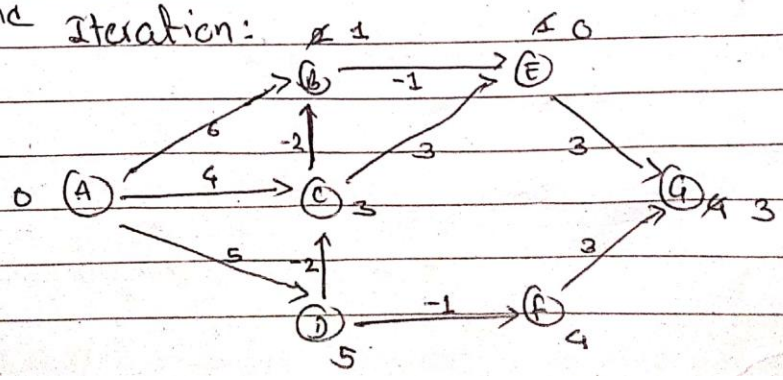


Edges List: (A,B), (A,C), (A,D), (C,B), (D,C)
(B,E), (C,E), (D,F), (E,G), (F,G)

1st Iteration:



2nd Iteration:



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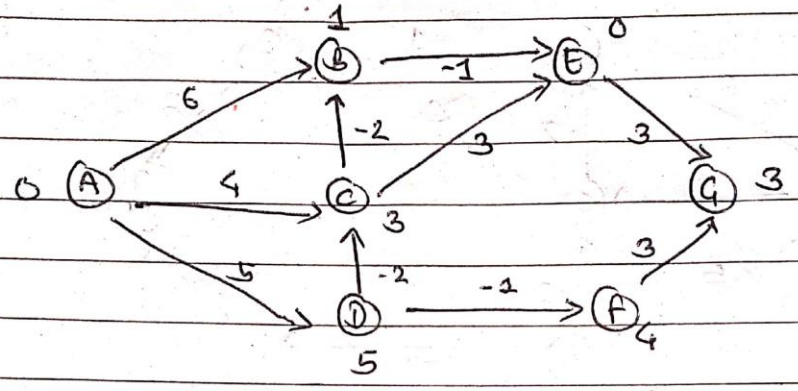
3rd Iteration:



shortest path:

A - 0
B - 1
C - 3
D - 5
E - 0
F - 4
G - 3