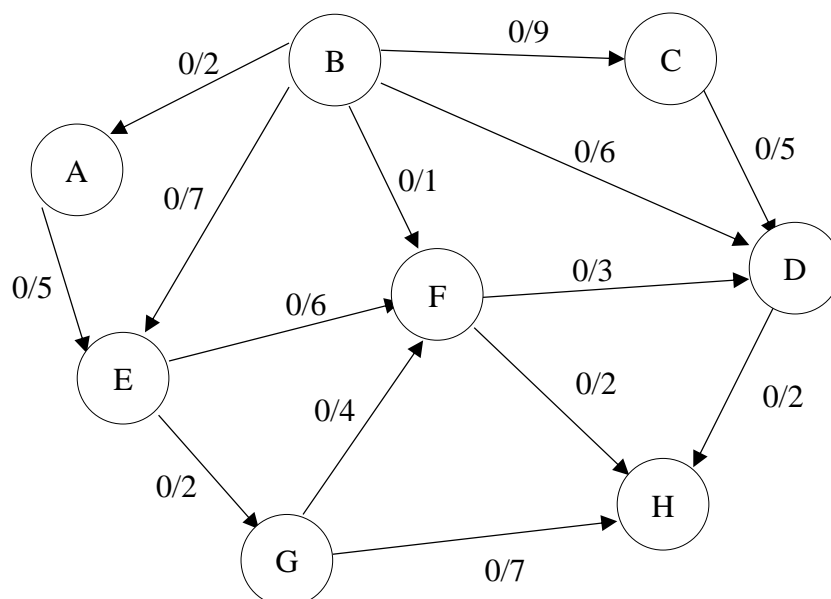**Problem-Set 14, Theoretical Part**

Run Edmonds-Karp algorithm [Cormen, Section 24.2] on the following network:

1. Identify the source and the sink of the network.
2. Construct the residual network.
3. For every iteration of the algorithm
      (a) show the augmenting path,
      (b) show the flow after the interation,
      (c) show the residual network after the iteration
4. Write down the maximum flow value after the last iteration.
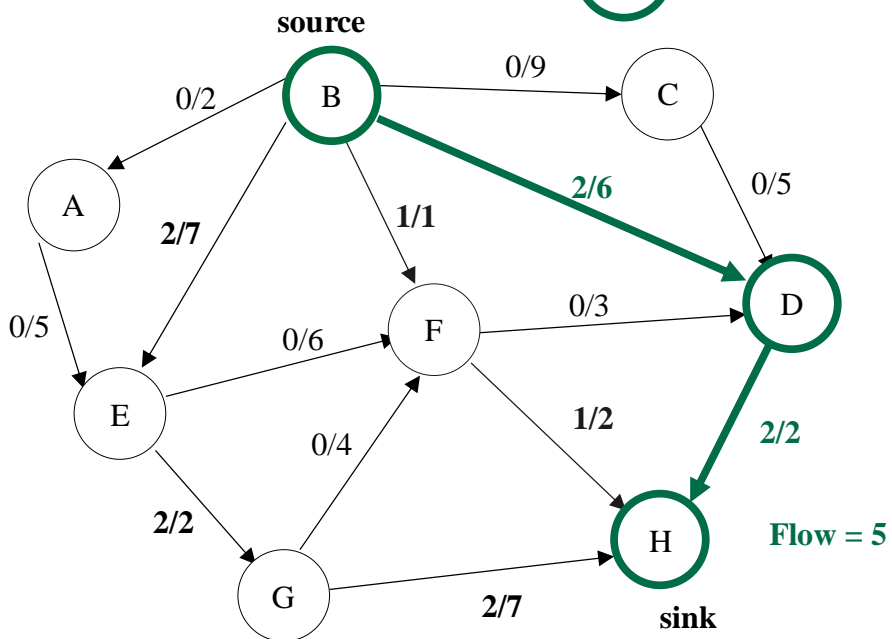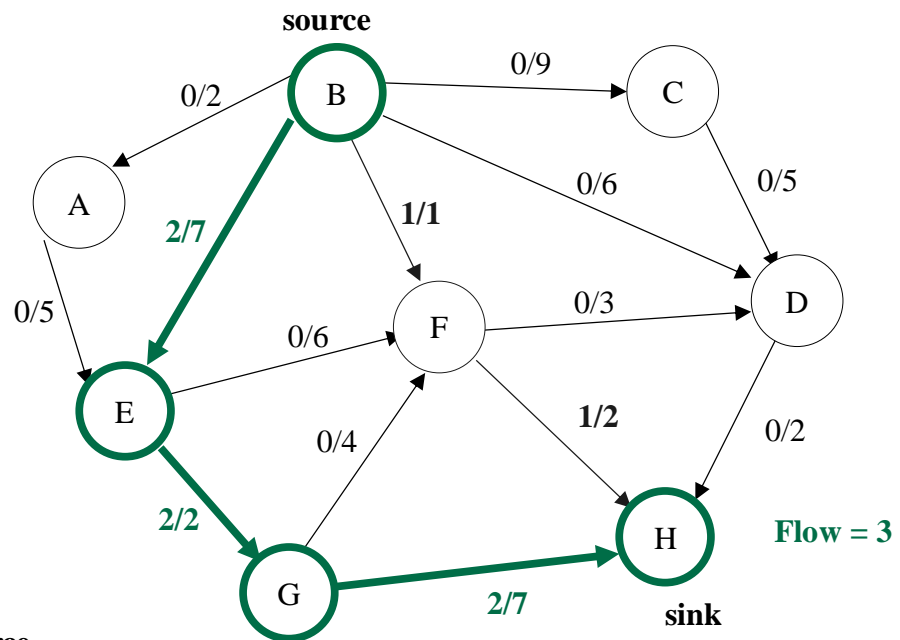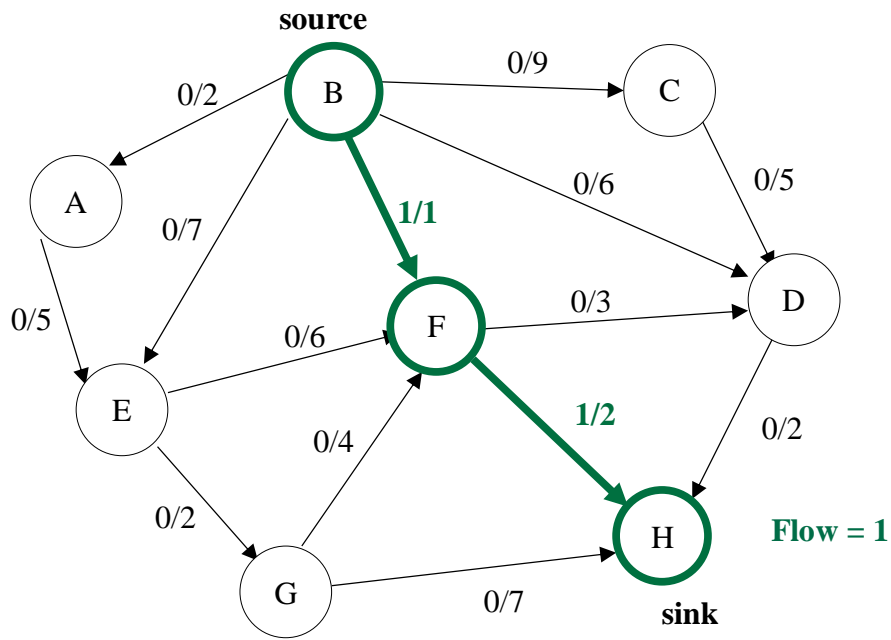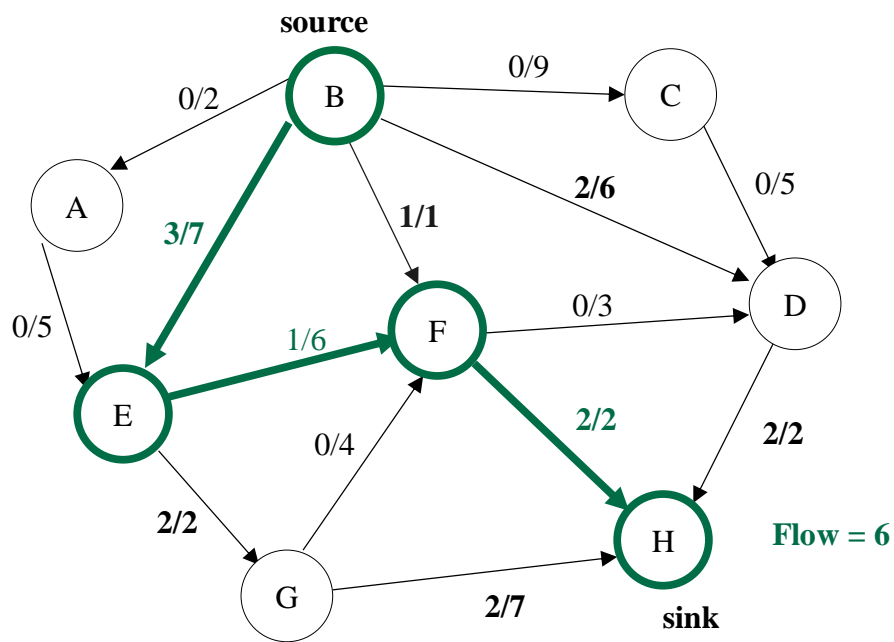5. Show that the flow is maximum by demonstrating a minimum cut of the network.
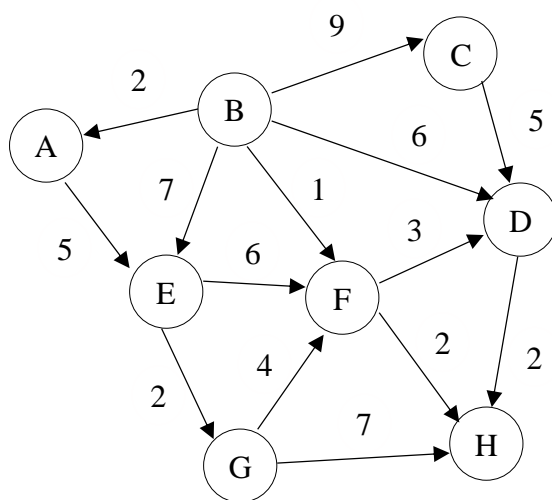
Solution:

1) B – source, no incoming edges,   H – sink, no outgoing edges

2)

3)

source

0/2

B → 0/9 → C

A

0/7

1/1

0/6

0/5

0/5

E

0/6 → F → 0/3 → D

0/4

1/2

0/2

0/2

G

0/7 → H   **Flow = 1**

sink

---

source

0/2

B → 0/9 → C

A

2/7

1/1

0/6

0/5

0/5

E

0/6 → F → 0/3 → D

0/4

1/2

0/2

2/2

G → 2/7 → H   **Flow = 3**

sink

---

source

0/2

B → 0/9 → C

A

2/7

1/1

2/6

0/5

0/5

E

0/6 → F → 0/3 → D

0/4

1/2

2/2

2/2

G → 2/7 → H   **Flow = 5**

sink

4) **Maximum Flow value is 6**

5) **Minimum Cut of the network value and Maximum Flow value are largely equal to each other. We can get Minimum Cut by removing E-G, F-H and D-H edges, which total weight is 6**