Q1) Suppose that you do a binary search for the key **39** in the following sorted array: 10 ,11, 25 ,31, 36, 39, 53, 55, 56, 64, 68, 75, 78, 82, 87 Give the sequence of keys in the array that are compared with 39**.**

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
10	**11**	**25**	**31**	**36**	**39**	**53**	**55**	**56**	**64**	**68**	**75**	**78**	**82**	**87**
low							**Mid**							**high**
low			**Mid**			**high**								
				low	**found**	**high**								

◆ Step 1

- Middle index = $\lfloor(0+14)/2\rfloor=7$
- Element = **55**
- Compare: 39 < 55 → go **left**

◆ Step 2

- New range: index 0 to 6
- Middle index = $\lfloor(0+6)/2\rfloor=3\backslash$
- Element = **31**
- Compare: 39 > 31 → go **right**

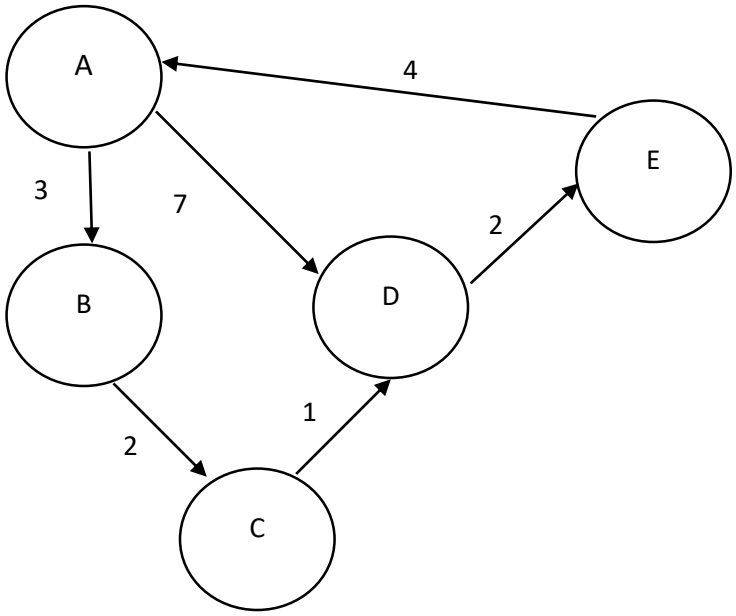
◆ Step 3

- New range: index 4 to 6
- Middle index = $\lfloor(4+6)/2\rfloor=5$
- Element = **39**
- Match found ✓

Q2) Consider the following **graph**, represented as an **adjacency matrix**:

	A	B	C	D	E
A	∞	3	∞	7	∞
B	∞	∞	2	∞	∞
C	∞	∞	∞	1	8
D	∞	∞	∞	∞	2
E	4	∞	∞	∞	∞

1. **Draw the corresponding graph.**
2. **What is the graph type?**
3. **Does the graph contain a cycle?**



2. Directed, weighted, cyclic

3. yes A→B→C→D→E→A

Q1) Suppose that you do a binary search for the key **75** in the following sorted array: 10 ,11, 25 ,31, 36, 39, 53, 55, 56, 64, 68, 75, 78, 82, 87 Give the sequence of keys in the array that are compared with 75**.**

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
10	**11**	**25**	**31**	**36**	**39**	**53**	**55**	**56**	**64**	**68**	**75**	**78**	**82**	**87**
low							**Mid**							**high**
								low			**found**			**high**

◆ **Step 1**

- Middle index = ⌊ (0+14)/2⌋=7
- Element = **55**
- Compare: 75 > 55 → go **right**

◆ Step 2

- New range: index 8 to 14
- Middle index = ⌊(8+14)/2⌋=11
- Element = **75**
- Match found ✓

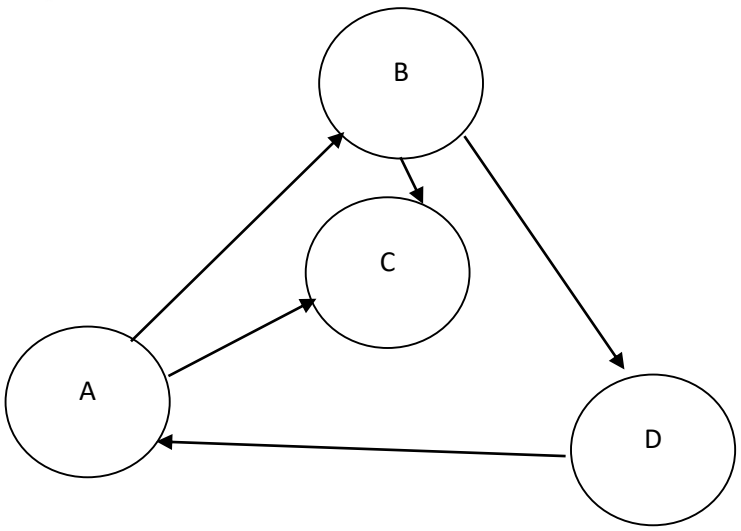
✓ Sequence of comparisons:

55 → 75

Q2) Consider the following **graph** represented as an **adjacency matrix**:

	A	B	C	D
A	0	1	1	0
B	0	0	1	1
C	0	0	0	1
D	1	0	0	0

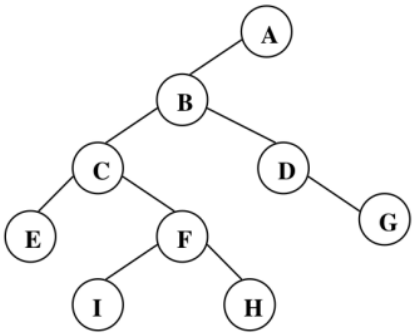
1. **Draw the corresponding graph.**
2. **What is the graph type?**
3. **Does the graph contain a cycle?**



2. directed, unweighted, cyclic

Yes A→B→D→A

Q1) Consider the following **graph**:

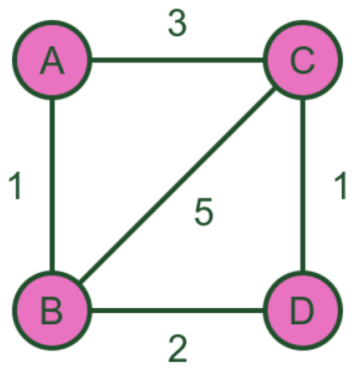


1. Represented its **adjacency matrix (A)**.
2. What is the type of the graph?

	A	B	C	D	E	F	G	H	I
A	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
B	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**
C	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**0**
D	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
E	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
F	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**
G	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
H	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
I	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

Undirected, unweighted, Acyclic

Q1) Consider the following **graph**:



1. Represented its **adjacency matrix (A)**.
2. What is the type of the graph?

	A	**B**	**C**	**D**
A	**inf**	**1**	**3**	**inf**
B	**1**	**inf**	**5**	**2**
C	**3**	**5**	**inf**	**1**
D	**2**	**inf**	**1**	**inf**

Weighted, undirected, cyclic