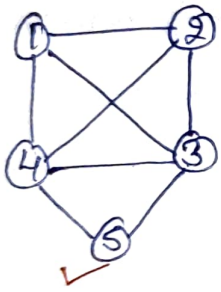
Hamiltonian Cycle →

If a graph is given, then we have to start from starting vertex and visit all the vertices exactly once and return back to the starting vertex.

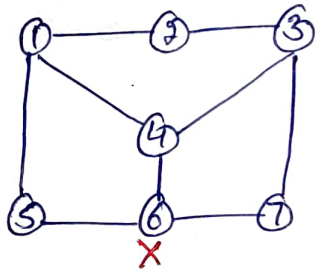
We have to check that is there any Hamiltonian cycle in the graph, if possible what is that cycle and if there are multiple cycle, find them all.

⇒ The graph may be directed or undirected but it must be a connected graph

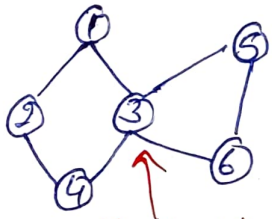
⇒ This is a N-P hard problem.



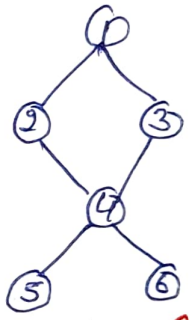
✓



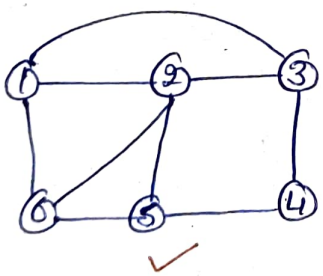
X



X Articulation Point.



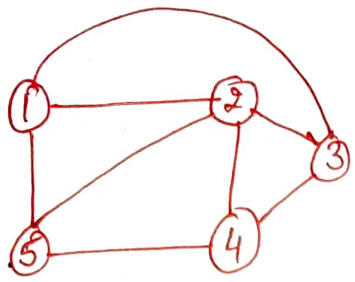
X Pendent Vertices



✓

1, 2, 3, 4, 5, 6, 1
1, 2, 6, 5, 4, 3, 1
1, 6, 2, 5, 4, 3 1
2, 3, 4, 5 6, 1, 2 ←

eg

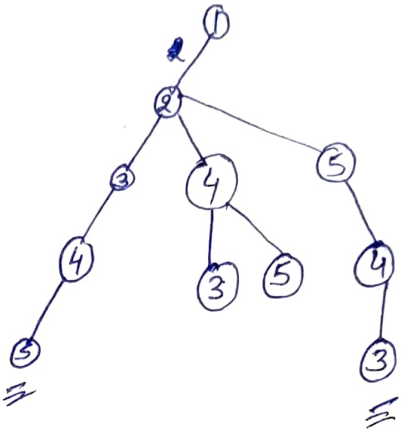


$$G = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 0 & 1 & 1 & 0 & 1 \\ 2 & 1 & 0 & 1 & 1 & 1 \\ 3 & 1 & 1 & 0 & 1 & 0 \\ 4 & 0 & 1 & 1 & 0 & 1 \\ 5 & 1 & 1 & 0 & 1 & 0 \end{array}$$

	1	2	3	4	5
x	0	0	0	0	0

1 2 3 4 5

1 2 5 4 3 1



Algo: Hamiltonian(K)

```
{ do
  { Nextvertex(K),
    if(x[K]==0)
      return,
    if(K==n)
      Print(x[1..n])
    else
      Hamiltonian(K+1)
  } while(True),
}
```

Algo: Nextvertex(K)

```
{ do
  { x[K]=(x[K]+1) mod (n+1),
    if(x[K]==0) return,
    if(G[x[K-1], x[K]] ≠ 0)
    {
      for(j=1 to K-1) do if(x[j]==x[K])
                          break,
      if(j==K)
        if(K<n or(K==n) &&
                G[x[n],x[1]] ≠ 0)
          return,
  } while true,
}
```