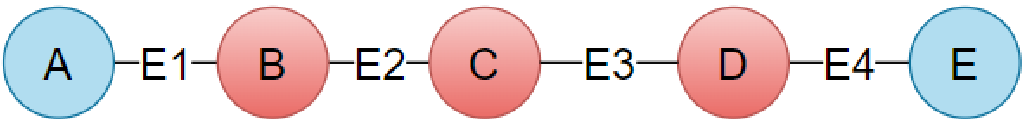
Find The Articulation Points in Graph

If removing a vertex and its related edges causes the graph to become disconnected, the vertex is considered to be an articulation point in the graph. Therefore, the number of related components in a graph grows as articulation points are removed. A connected component, or simply component, is a subgraph where every pair of nodes is connected to every other node by a path.

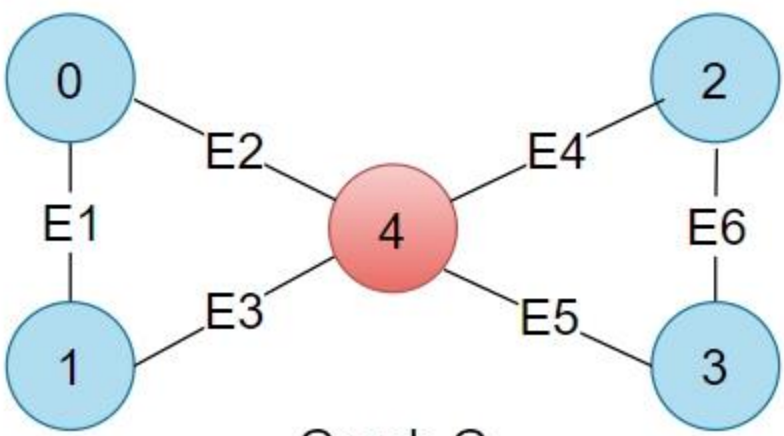
Sometimes articulation points are referred to as cut vertices.

Example:



B, C, D are the Articulation Points.

Example 2:



Graph G

Output: 4

Example 3:

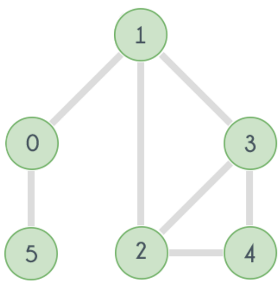


Fig. 1

Output: {1, 0}

Approach 1: Function to find articulation points in a graph using DFS Traversal

- **Explanation:**
    - The algorithm uses DFS traversal to find articulation points in the graph.
    - It maintains information about discovery and lowest times for each node.
    - An articulation point is identified by checking if the lowest time of any child is greater than or equal to the discovery time of the current node.
    - The algorithm handles the special case of the root node in the DFS tree separately.
    - The result is a vector containing the identified articulation points.
- **Time Complexity:**
    - **The algorithm performs DFS traversal, which is O(V + E), where V is the number of vertices and E is the number of edges.**
- **Space Complexity:**
    - **Additional space for arrays to store discovery and lowest times: O(V)**
    - **Additional space for the result vector: O(A), where A is the number of articulation points.**
    - **Overall space complexity: O(V + A)**