Graph can be Represented By :

1. **Adjacency Matrix :** 2D Array
   Matrix[i][j] = **1** {Undirected, Unweighted}
   Diagonal is for **self loop** in the matrix.
   For **weighted graph** we will put, Matrix[i][j] = $\mathbf{W_{ij}}$ {weight of an edge}

   DrawBack : Can't express **Multi Edge** precisely.
   For Weighted graph its not possible

2. **Adjacency List :** List or Vector
   For every node, how many node we can visit will store with a list/vector

   Unweighted :
   Self loop : pushback the value on its own index 1 = 2, 1
   Multi Edge : pushback same edge multi time. 3 = 1, 1, 2 (3 edge)

   Weighted :
   Weighted value will be paired up in a list/vector with the connected nodes.

   E.g = 0 = [1, 4], [2, 6] Here, means that, from 0 there are edges on 1, 2 with weighted value 4, 6 sequentially.

3. **Edge List :** Edge + List (Easiest)
   Edges between nodes. [**Undirected**]
   E.g = [0, 1] , [1, 2], [1, 3], [2, 3]
   For Weighted :
   E.g = [0, 1, **5**] , [1, 2, **3**], [1, 3, **2**], [2, 3, **1**]

   For **Directed :**
   x will be from y will be to point
   E. g = [0, 1] , [1, 2], [2, 3] , [0, 1], [1, 1]{directed, SelfLoop, multiedge}

4. **Time Complexity :** O(1), O(n), O(n Log n), O(n^2), O(Log N)