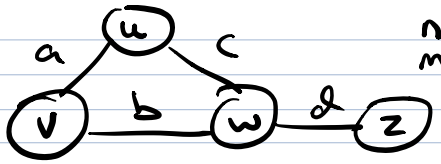
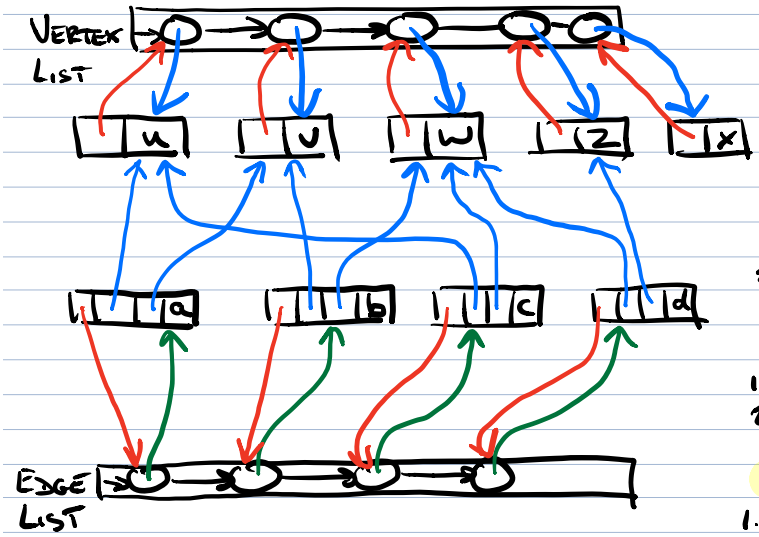


n vertices
m edges

— Reference to Vertex
— Reference to Edge
— Reference to List Node



Insert Vertex / Edge

1. Create vertex / edge object
2. Insert into list
3. Store node reference

O(1)

Incident Edges

1. Iterate all edges in the graph
2. Check if incident on vertex

O(m)

Are Adjacent

1. Iterate the edge list
2. Check if an edge connects the vertices

O(m)

Remove Edge

1. Remove from edge list

O(1) Because of the reference to the list node (otherwise O(m))

Remove Vertex

1. Remove all incident edges
   - For each incident edge O(m)
     Remove edge O(1)
2. Remove from vertex list O(1)

O(m)

Space

Vertices: n vertex objects + n vertex list nodes
$= O(n)$

Edges: m edge objects + m edge list nodes
$= O(m)$

Total: $O(m+n)$