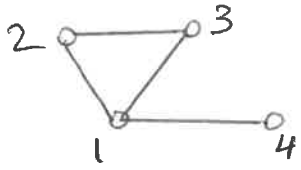
Graph representation (review)

- adjacency-matrix representation
- adjacency-list representation

Adjacency-matrix representation of a graph $G=(V,E)$

- use a $|V| \times |V|$ matrix $A=(a_{ij})$

$$a_{ij} = \begin{cases} 1 & \text{if } (i,j) \in E \\ 0 & \text{otherwise} \end{cases}$$



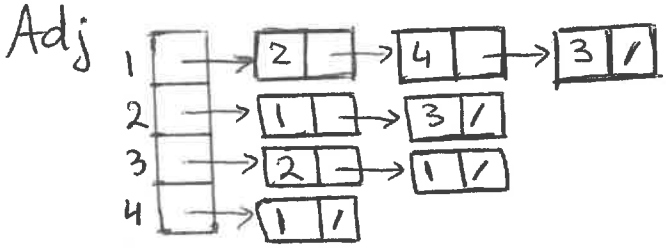
A

	1	2	3	4
1	0	1	1	1
2	1	0	1	0
3	1	1	0	0
4	1	0	0	0

- space $\Theta(V^2)$
- RT to determine whether $(u,v) \in E$ is $\Theta(1)$

Adjacency-list representation of a graph $G=(V,E)$

- use an array of linked-lists with one linked-list for each vertex



- space $\Theta(V+E)$
- RT to determine whether $(u,v) \in E$ is $O(u.degree)$

- If the graph G is
  - sparse, then the adjacency-list representation is preferred
  - dense, then the adjacency-matrix representation is preferred