GRAPH DATA STRUCTURES (for maximum order 2)

(1) Adjacency matrix
`G = (V, E)` where V is the set of vertices, `{ v1, v2, … vn}` and `E` is the set of edges `{ (vx vy) | vx, vy ε V }`.

Representation is an n X n matrix A[][], where A[i, j] is true if there is an edge (vi, vj) and A[i,j] is false if there is no such edge.

The representation is easily extended to directional graphs.
The representation is easily extended to weighted graphs.
The representation is easily extended to graphs where the domain and range are different.
The representation is easily extended to maximum order k graphs.

Space requirement is Θ ($|V|^2$). For sparse graphs, this can be unacceptably wasteful of space.

(2) Adjacency list

For each vertex, `vi`, maintain a list of all adjacent vertices.

For undirected graphs, each edge `(vi, vj)` will be stored twice, once in `vi`'s list, a second time is `vj`'s list.

The representation is naturally used for directional graphs.
The representation is easily extended to weighted graphs.
The representation is naturally used for graphs where domain and range are different.
The representation is extendible to maximum order k graphs (how?)

Practice:

Consider the following maximum order 2 graph. How is it represented in each data structure?