**Exercise 01 - Undirected Graph**

**The video introduces 3 ways to represent undirected graphs.**

**What are they?**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Complete the sentences below:**  
The listed options may be used more than once  
*( adjacency lists, adjacency matrices, lists of edges, dense, sparse )*For dense graphs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are a good representation.  
For sparse graphs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are a good representation.  
  
Most large graphs in real-world applications are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ graphs.

**Complexity of Operations:**

V .. number of vertices E .. number of edges  
List the memory that is used by the different representations and the time complexity of the three operations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| graph representation | **memory used** | **add edge** | **edge between v and w** | **iterate over all vertices adjacent to v** |
| **list of edges** |  |  |  |  |
| **adjacency matrix** |  |  |  |  |
| **adjacency list** |  |  |  |  |