# Title

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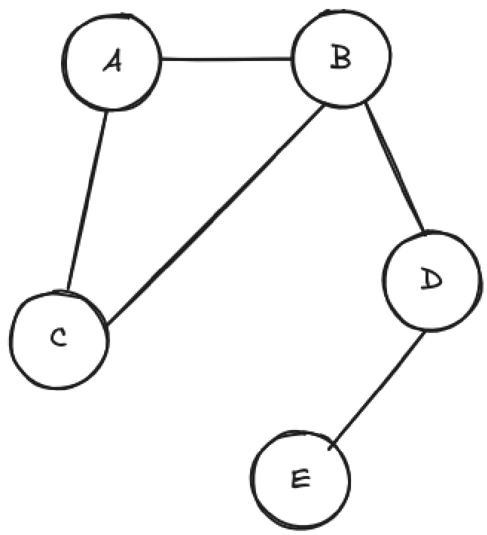
## Q1 (5 pts)

1. Draw the graph.




2. Compute the degree of each node.

$$\deg(A) = 2$$
$$\deg(B) = 3$$
$$\deg(C) = 2$$
$$\deg(D) = 2$$
$$\deg(E) = 1$$

3. Verify the **Handshake Theorem**.

$$\sum_{v \in V} \deg(v) = 2|E|$$

$$2 + 3 + 2 + 2 + 1 = 10 = 2|E|$$

4. Explain briefly why this must always hold for undirected graphs.

   This must always hold true for undirected graphs because each edge always connects two nodes. This means those two nodes increase their degree by one when connected by one edge. By extension, each edge increases the sum of all node degrees.

   Therefore, the sum of all degrees of nodes is equal to two times the number of edges.

## Q2 (5 pts)

1. Write down the **degree distribution**: how many nodes have degree 1, 2, 3, etc.

| Degree | No. of Nodes |
|---|---|
| 1 | 1 |
| 2 | 3 |
| 3 | 1 |

2. Write a short **Python snippet** that:

   - Stores the graph as a dictionary of neighbors.
   - Loops over nodes to compute degrees.
   - Prints the degree distribution.

```python
from typing import Counter


V = {"A", "B", "C", "D", "E"}
E = {("A", "B"), ("A", "C"), ("B", "C"), ("B", "D"), ("D", "E")}

graph = {v : [] for v in V}
for e in E:
    a, b = e
    graph[a].append(b)
    graph[b].append(a)

degrees = Counter(len(edges) for edges in graph.values())

for degree, count in degrees.items():
    print(f"{count} nodes have degree {degree}")
```