From Sets to Graphs

Binary relations

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Network of items and connections between them.

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- Social networks (friendship, family tree);
- Molecular graphs (atoms and chemical bonds);
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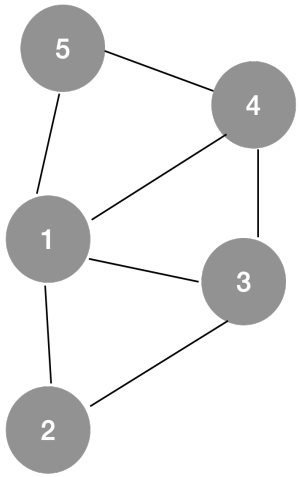
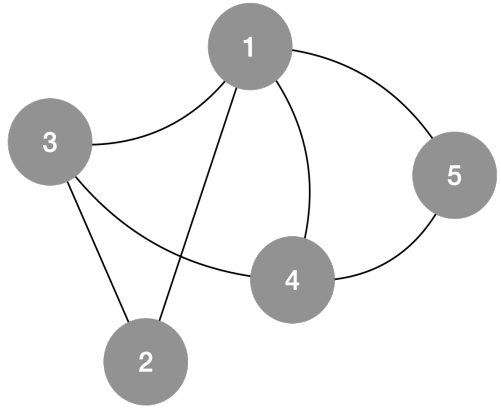
Graphs: graphical representation of our binary relation.

- Vertices (V);
- Edges (E);

Graph representations and degrees





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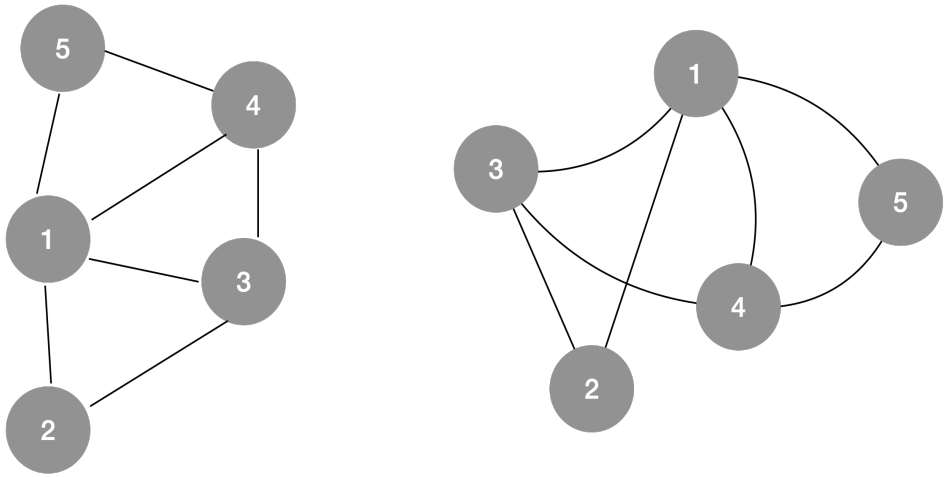
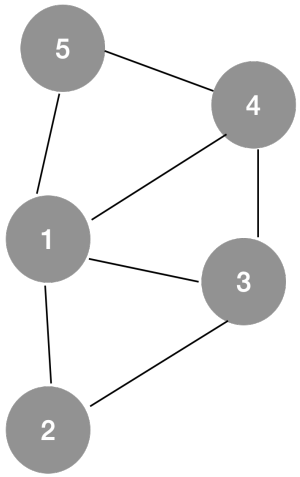


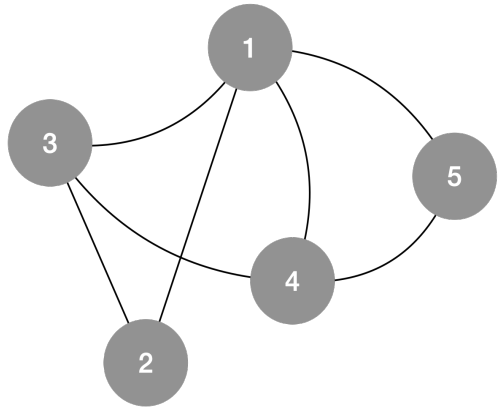
- Both graphs have:

$$\begin{aligned} V &= \{1, 2, 3, 4, 5\} \\ E &= \{(1, 2), (1, 3), (1, 4), (1, 5), (2, 3), (3, 4), (4, 5)\} \end{aligned}$$

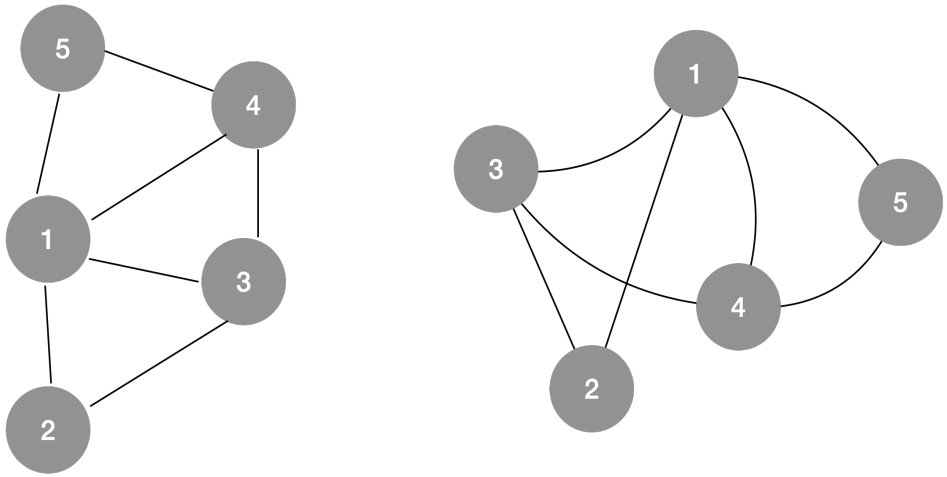
- $G(V, E)$ represented in sets;
- $G(V, E)$ represented in matrix;

Degrees





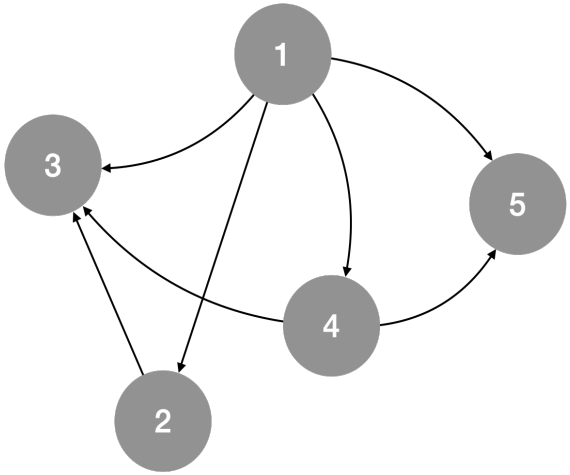
Degrees

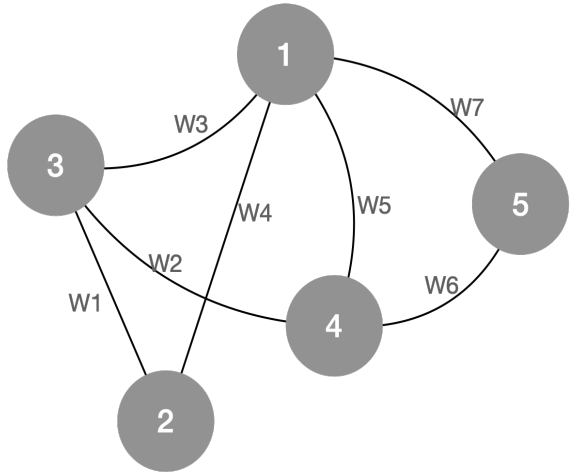


- The degree of a vertex is the number of edges on it:

$$d(1) = 4 \quad d(2) = 2 \quad d(3) = 3 \quad d(4) = 3 \quad d(5) = 2$$

Graph Variants





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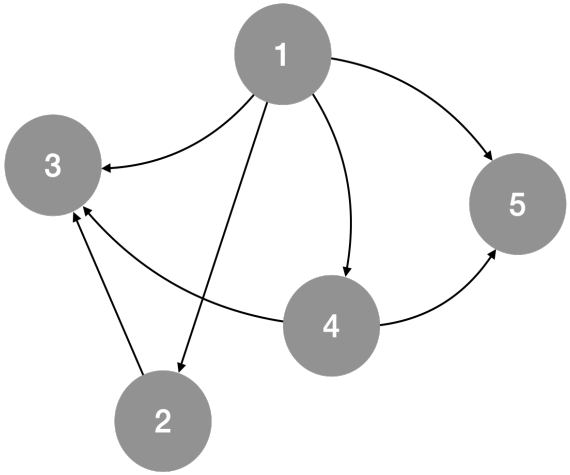

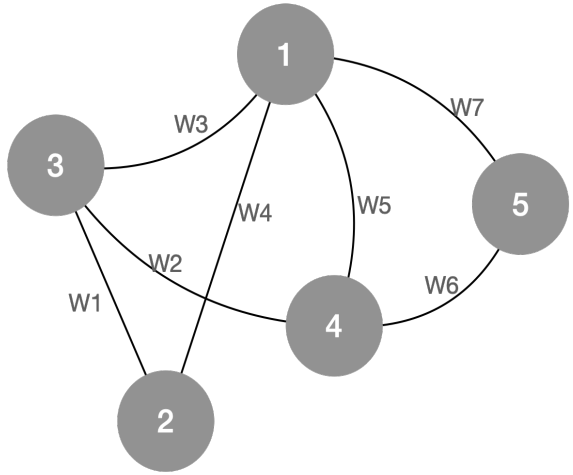

- Directed graph: Instagram followers.
- Weighted graph: Amazon delivery.
- More in lab exercises.

Q & A