1. Show that a finite simple graph with more than one vertex has at least two vertices with the same degree.

2. A graph G has 13 edges and 3 vertices of degree 1, 2 and 3. All remaining vertices have degree 4. How many vertices does the graph G have?

3. Check which sequences are graphic (if yes then draw a graph):

$$(4,4,4,3,2,1,1), (4,4,3,2,2,1), (4,4,3,2,1)$$

4. The incidence matrix is given for a graph G:

$$\begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}.$$

   Find the degree sequence, order and size of G. Draw the graph G.

5. Find the incidence matrix and the adjacency for the graph $K_{2,3}$.

6. Give two examples of graphs that are not isomorphic but they have the same degree sequence.

7. Find a graph of order 4 that is isomorphic with its complement.

8. Find a graph of order 5 that is isomorphic with its complement. Is it possible for graphs of order 2 or 3?

9. Find a complement for the complete bipartite graph $K_{m,n}$.

10. Prove that a graph is bipartite if and only if it contains no odd cycles.