1) Prove that if \( G \) is disconnected graph, then \( \overline{G} \) is connected.

2) Find all cut-vertices and bridges in the graph below.

3) (a) Show that if \( G \) is an \( r \)-regular connected graph, where \( r \) is even, then \( G \) contain, no bridges.

   (b) Is the statement in (a) still true if we replace “\( r \) is even” by “\( r \) is odd”?

4) Prove or disprove (by a counterexample)

   (a) if \( v \) is a cut–vertex of a graph \( G \), then \( k(G - v) = k(G) + 1 \).

   (b) If \( e = uv \) is a bridge in \( G \), then there is a unique \( u - v \) path in \( G \).

   (c) If \( G \) is connected graph containing no bridges, then \( G \) is nonseparable.

5) Can a graph of order \( n \) have three vertices of degree 3 and one of degree 1? If yes, give an example. If no, say why not.
6) If $G$ is a graph with $n$ vertices, then what are the maximum and minimum numbers of

(a) Edges \hspace{1cm} (b) Bridges \hspace{1cm} (c) Blocks

7) Let $G$ be a nontrivial connected graph such that each vertex is of even degree. Show that $G$ has at least one circuit.

8) 1.37 & 1.40 (Textbook)