

**Q1.** Let  $X$  and  $X'$  be minimal separators in  $G$  such that  $X$  meets (intersects non-trivially) at least two components of  $G - X'$ . Show that  $X'$  meets all the components of  $G - X$ , and that  $X$  meets all the components of  $G - X'$ .

**Q2.** Show the block graph of any connected graph is a tree.

**Q3.** Let  $G$  be a  $k$ -connected graph, and let  $xy$  be an edge of  $G$ . Show that  $G/xy$  is  $k$ -connected if and only if  $G - \{x, y\}$  is  $(k - 1)$ -connected.

**Q4.** (i) Let  $e$  be an edge in a 2-connected graph  $G \neq K^3$ . Show that either  $G - e$  or  $G/e$  is again 2-connected.

(ii) Does every 2-connected graph  $G \neq K^3$  have an edge  $e$  such that  $G/e$  is still 2-connected?

**Q5.** Show that every transitive graph  $G$  with  $\kappa(G) = 2$  is a cycle. Hint: Exercise 3.4 is useful.