1. 5. Let G be a k-connected graph. Let $A = \{a_1, a_2, \ldots, a_k\}$ and $B = \{b_1, b_2, \ldots, b_k\}$ be disjoint subsets of $V(G)$ such that $|A| = |B| = k$. Prove that G contains k pairwise disjoint A, B-paths. (That is, G contains k paths each of which start with a vertex from the set A, end with a vertex from the set B and share no vertices.)

Solution:
Create G' by adding two vertices, v_A and v_B and $2k$ edges to G such that v_A and v_B both have k edges incident to them such that $v_A \leftrightarrow a_i$ and $v_B \leftrightarrow b_i$ for every $1 \leq i \leq k$. Since G' only adds edges and vertices to G, G' is k-connected as well. Hence, there exists k pariwise disjoint A, B-paths in G' from v_A to v_B.