Section 4.6
Connectivity and Networks

TWO SIMILAR RESULTS

Menger’s Theorem relates the maximum number of disjoint paths and the minimum number of vertices in a separating set. The Max Flow-Min Cut Theorem relates the maximum flow and the minimum capacity of a cut. Both involve the equality of two quantities, one of which is a maximum and the other a minimum. The Max Flow-Min Cut Theorem can be used to prove Menger’s Theorem.

MENGER’S THEOREM

Theorem 4.6.1 (Menger’s Theorem): For distinct nonadjacent vertices \( u \) and \( w \) in a graph \( G \), the maximum number of pairwise internally disjoint \( u – w \) paths equals the minimum number of vertices in a \( u – w \) separating set.
EDGES VERSION OF MENGER’S THEOREM

**Theorem 4.6.2:** In a graph $G$, the maximum number of edge disjoint $u - v$ paths equals the number of edges in a $u - v$ separating set.