

- This homework set has *three* questions, each one with increasing difficulty. You must work in pairs to determine the solutions.
- Every member of the team must be able to explain how you arrived at the answer.
- You may be asked to present your answer on the blackboard.

1. Let G be an infinite graph and $A, B \subseteq V(G)$. Show that if no finite set of vertices separates A from B in G , then G contains an infinite set of disjoint $A - B$ paths.
2. Show that the $k \times k$ grid has tree-width at least k .
3. Show that if a graph has circumference $k \neq 0$, then its tree-width is at most $k - 1$.