

Math 4670/5670 – Combinatorics  
Suggested Exercises for April 15, 2024

1. Let  $T = (V, E)$  be a tree. Prove that adding any additional edge to  $T$  (connecting two vertices that already exist in  $T$ ) must create a cycle.
2. Let  $T = (V, E)$  be a tree. Prove that deleting any single edge of  $T$  will cause  $T$  to become disconnected.
3. Prove that any connected graph with  $n$  vertices must have at least  $n - 1$  edges. (In other words, it is not possible to build a connected graph with  $n$  vertices and  $n - 2$  edges or fewer.)