Math589 Homework 4

1. [1pt] Use induction and Lemma 4.1.3 to prove any plane forest has exactly one face.
   Solution.

2. [1pt] Use the Jordan curve theorem and Lemma 4.2.1 to show that if a plane graph has only one face, then it is a forest.

   Solution.

Questions to ponder:

1. Which plane graphs have exactly two faces?

2. What happen if a plane graph has two faces with the same frontier? What can we say about the graph?

3. Is the boundary of a face always a cycle? Give some examples.

4. If a graph is 2-connected, is the boundary of a face always a cycle?

5. Practice your TEXnique at `https://texnique.xyz/`.

6. Let G and H be two graphs. Google how to use SageMath to find a subgraph of G that is IH, or return None. You may use SageCell to try your code.