Show all work for full credit. Eight problems, each problem is 6 points (48 points).

1. True/False, circle one:

   True   False   Every tree has no cycles.
   True   False   If a tree has 2002 vertices, then it has 2002 edges.
   True   False   Every two vertices in a tree are connected by exactly two paths.
   True   False   Every internal vertex in a tree has degree one.
   True   False   In a binary tree, every parent has at most 2 children.
   True   False   A binary tree of height 5 can have up to 32 terminal vertices.

2. Prove that every tree is bipartite.
In problems 3 and 4 refer to the following Graph $G$:

3. Use the ordering $zabcdefghijkl$ of vertices and draw a spanning tree for the graph $G$ obtained from the breath-first search algorithm.

4. Use the ordering $zabcdefghijkl$ of vertices and draw a spanning tree for the graph $G$ obtained from the depth-first search algorithm.
In problems 5 and 6 refer to the following Graph $H$:

5. Use the ordering $zabcdefghijkl$ of vertices and draw a minimal spanning tree for the graph $H$ obtained from the Prim’s algorithm.

6. Use the ordering $zabcdefghijkl$ of vertices and draw a minimal spanning tree for the graph $H$ obtained from the Kruskal’s algorithm.
7. List the vertices of the tree $T$ in the pre-order.

\[ T: \]

8. Draw a binary tree corresponding to the following algebraic expression and rewrite it in postfix notation:

\[
\frac{(a + b)}{c - d} - \left( \frac{u \cdot v}{x - y} \right)^{\frac{3}{10}}
\]