

EECS 281, Week 6: Wednesday

AVL Trees

Height of a node: _____.

In-order predecessor: _____.

In-order successor: _____.

Left rotation:

Right rotation:

Insert 4, 8, 15, 23, 16 and 42 into an AVL tree.

Delete 8 from the AVL tree.

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Graphs

Graph: $G = (V, E)$

Set of _____, a.k.a. _____.

Set of _____: pairs of vertices.

Vertices with an edge between are _____.

Vertices or edges may have _____.

A _____ is a sequence of vertices connected by edges.

A _____ is a path whose first and last vertices are the same.

A graph with a cycle is _____. A graph without a cycle is _____.

Two vertices are _____ if there is a path between them.

If all vertices are connected, we say the graph is _____.

Graphs Representations

Adjacency matrix

Adjacency list

Graphs Traversals

Pre-order depth-first traversal

Post-order depth-first traversal

Breadth-first traversal

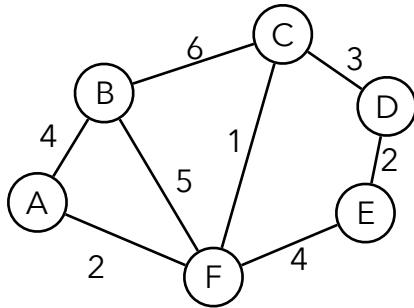
Graph Problems

Shortest path: _____.

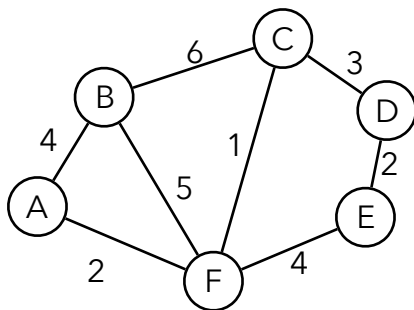
Minimum spanning tree: _____.

Minimum Spanning Tree

Prim's Algorithm



Kruskal's Algorithm



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Detecting Cycles

Given a *directed* graph represented with an adjacency matrix, determine if the graph has a cycle. Feel free to add helper functions or use an extra page if needed.

```
bool isCyclic(const vector<vector<bool>> &graph) {
```

What is the worst case time complexity of `isCyclic` in terms of $|V|$ and $|E|$? Explain.

When finished, take a picture of your answers and email it to Maxim.