Quick Review:

Chapter 7: sections 1-3. Networks

A tree is a connected graph with no circuits.

Properties of trees:
1. There is one and only one path connecting any two vertices.
2. Every edge is a bridge.
3. The number of edges is one less than the number of vertices. Furthermore, a connected graph having any of these properties must be a tree.

A spanning tree of a connected graph is any connected tree in the graph having all of the vertices of the graph. For a weighted graph, a minimum spanning tree is a spanning tree with the smallest possible total weight.

Kruskal’s Algorithm:
Suppose we have a connected graph with N edges.
- Choose the cheapest (smallest weight) edge in the graph (if there is more than one, pick any one of them).
- Next pick the cheapest remaining edge.
- Keep on choosing the cheapest remaining edge, except that you must never choose one which forms a circuit when combined with the ones you’ve already chosen.
- Stop after you have chosen N-1 edges.

Kruskal's Algorithm is both optimal and efficient, so we don’t have to look for any better algorithms.
Chapter 8: sections 1-3, 5, 6. Project Planning

A project digraph is a directed graph with numbers attached to each vertex: the vertices represent tasks and the number at a vertex is the time it takes a "processor" to complete that task. A directed edge from A to B is a "precedence relation": it means A has to be completed before B can be started.

A schedule is a listing of when each of the processors should carry out the various tasks. The finishing time is the time it takes to carry out the entire project using a particular schedule.

Priority List Algorithm for making a schedule:
1. Decide how many processors you are using: P1, P2, etc.
2. Choose a priority list: you do tasks in this order unless it violates a precedence relation.
3. At each moment, look at all the eligible tasks (the ones that don’t have an unfinished task that needs to be done first), and choose the one with the highest priority.
4. Assign that task to the first operator which is not doing anything.

In a directed graph, a path from vertex X to vertex Y is a sequence of directed edges; the first starts at X, second starts where the first ends, etc., with the last one ending at Y. Each path in a project digraph has a processing time: the sum of the times for doing each of the tasks involved in that path. The critical path for a vertex X is the path from X to End that has the longest processing time. The processing time of that critical path is called the critical time for X.

The critical path list is the priority list obtained by writing the tasks in decreasing order of critical times. The critical path algorithm (CPA) is to compute the schedule using the critical path list.