1.)Induction
2.)Asymptotic Analysis
3.)Divide and Conquer
4.)Greedy Algorithms
5.)Dynamic Programing
6.)Graphs
- graph representation
- BFS/DFS
- bellman/dijstra
- prims/kruskal
- (if time) all-pairs shortest path

7.)Proofs: for greedy choice and suboptimality
8.)some complexity theory if time

The focus will be on
Last half of quarter BUT you will use all skills from the first half specifically

Q0.) Algorithm Analysis - analyze code possibly complexity theory question
Q1.)Implement DFS/BFS on sample graph, know and analyze the run-time off.
Implement Bellman/Dikstra on sample graph, know and analyze the run-time off
Q2.)Prims/ Kruskals on sample graph, know and analyze the run-time off
Q3.) Algorithm Design:
Divide & Conquer (see Similar to quizzes and midterms and hws)
Greedy (see Similar to quizzes and midterms and hws)
Dynamic Programming (see Similar to quizzes and midterms and hws)
Graph algorithm design - similar to hw5 or tehse sample questions from the last part of the quarter that could appear in Q3:

a) You have n houses which you want to connect by fiber-optic cables. Your goal is to make sure that there is a route (possibly indirect, such as sending from house A to B then from B to C). For each pair of houses i, j, you know the cost $c(i, j)$ for putting a cable between the two houses (cables allow two way traffic and $c(i, j) = c(j, i)$).

You want a minimum cost collection of cables (minimize the sum of the costs of the cables selected) that allows routes between all the cities.

b.) Suppose you have roads between cities each of which takes a dollar toll. Find the cheapest route from a source city to every other city given the cost of each road is 1.

c.)

create a most efficient algorithm for maximum spanning tree and prove that it finds the optimal solution

For the above, if you use greedy show both greedy property and suboptimality. If you use dynamic show suboptimality property holds.