# CSE 5311 Final Exam Preparation

* Minimum Spanning Tree
  - Kruskal
  - Prim

* Shortest Path Problem
  - Dijkstra
  - Bellman-Ford

* Network Flow
  - Ford-Fulkerson Algorithm
  - Dinic Algorithm

* Process Management
  ① Brute-force, Greedy by features
  ② Shortest Time First Compute
    - Greedy, Prove

* Geometric Algorithms
  - Check whether given 4 points form a square.
  - Find Simple Closed Path for a given set of points
  - Closest Pair of Points using Divide and Conquer algorithm
  - Optimum location of point to minimize total distance - ternary search

* Polygon and Convex Hull
  - Interior and Exterior angle $\frac{360}{n}$
  - A given point lies inside or outside a Polygon
  - Tangents between two convex polygons
  - Find the number of diagonals in n sided convex polygon $nC_2 - n$
  - Convex Hull - Jarvis's Algorithm
    - Graham Scan

* Topological Sort
* Critical Path Method
  - Critical Time
  - Critical Path

* P : Problems, solvable, deterministically in polynomial time
  NP [ solvable in polynomial time by nondeterministic Turing M.
  NP [ verifiable in polynomial time by deterministic Turing M.
  NP-Complete : hardest Problems in NP
  NP-Hard : hardest Problems including non-NP

* NP-Completeness
  - Tractable Problems
  - Intractable Problems
  - Unsolvable (Undecidable) Problems

* NP Complete Problems
  - Determine a given graph divided into 2 cliques
  - Minimum Vertex Cover Approx.
  - Maximum Independent Set = Maximum clique Approx.
  - Hamiltonian Cycle — DFS
    - Hamiltonian Path
  - Traveling Salesperson Problem Approx.
    ↔ Hamiltonian Cycle
    ↔ Dijkstra
    - triangle inequality
  - Smallest cost subset
    - cost ratio : $\frac{C_i}{|S_i - I|}$