CSE326 **Review Topics for Final Exam**

- Linked lists. Simple linked lists. Queues; splitting and concatenating queues. List quicksort. Stacks. Radix sort. Representation of graphs using adjacency lists. Depth-first search
- Recursion. Designing algorithms recursively.
- Analysis of algorithms. Time complexity, Growth rates of functions. Worst case and average case. Formulation and solution of recurrences. Examples: binary search,mergesort, maximum subsequence sum.
- Trees and traversals. Multiway trees, left child and sibling pointers, preorder, postorder. Binary trees, inorder traversal.
- Binary search trees. Insert, delete, find.
- AVL trees. Single and double rotations. Insert, delete, find.
- Splay trees. Splaying, split, join, insert, delete, find. Amortized analysis, potential functions.
- B-trees. Insert, delete, find.
- Hashing. Open and closed hashing. Hash functions. Uniform probing, linear probing, quadratic probing, double hashing, rehashing, extendible hashing.
- Priority queues. Binary heaps. Insert, delete-min, increase, decrease, delete, build-heap, heapsort.
- Mergeable priority queues. Implementations of merge, insert and delete-min using leftist heaps, skew heaps and binomial queues. Amortized analysis of skew heaps.
- Minimum spanning trees. Trees, forests, cycles, cuts. Necessary and sufficient condition for an edge to lie in the MST in the case of distinct edge weights. Algorithms for constructing a MST.
- Disjoint set ADT. Implementation using up-trees. Union-by-Rank. Path compression. Time bound in terms of $\alpha(m, n)$.

- Internal sorting. Worst case and average number of comparisons for Insertion sort, Shellsort, Heapsort, Mergesort and Quicksort. Twenty Questions model. Lower bounds on the number of comparisons required for sorting in the worst case and on the average.

- External sorting. Characteristics of external storage devices such as disks.Replacement selection. Multiway merging.

- Graph algorithms. Representation of graphs. Execution times and proofs of correctness for topological sorting and breadth-first-search.