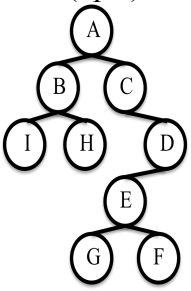
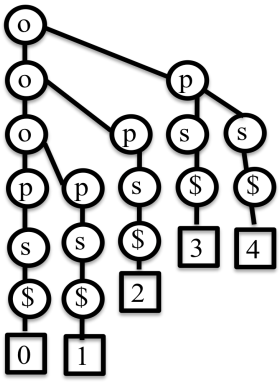
Sample Solutions

COS 226 – Final Exam – Spring 2009

1. **MST** (8pts)
    1. 4,9,18,19,21,22,23,30
    2. 18,23,21,19,30,4,9,22
2. **KMP** (5pts)
    1. A B A B A C C B A
    2. W: 0 X: 5 Y: 1 Z: 4
3. **Mystery Code** (5pts)
    Answer: d
4. **Acronyms** (8pts)
    SAT: g (a logic problem)
    KMP: c (substring-search algorithm)
    NFA: h (basis for grep)
    DFA: a (basis for KMP algorithm)
    DFS: d (fundamental recursive method)
    BFS: e (for single source shortest path in unweighted graphs)
    PFS: b (general graph searching scheme)
    NP: f (set of all problems checkable in polynomial time)
5. **LZW compression** (4pts)
    1. Answer: c (square root of N)
6. **2D trees** (6pts)



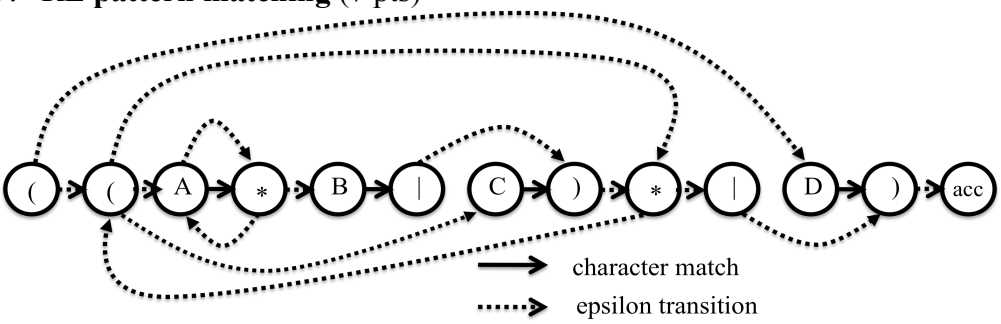
7. **Suffix TST** (6pts)



8. **String symbol table** (7 pts)
    M-ary trie: b
    BST: a,c,d
    TST: a,b

Red-black tree: a,c

9. **RE pattern matching** (7 pts)



10. **RE pattern matching II** (4pts)

    Answer: a

11. **7 sorting algorithms** (14 pts)

    Answer: g, c, b, d, f, e, a

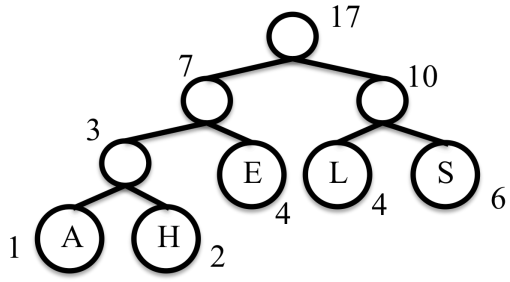
12. Convex hull

    Next points; current hull
    A; A
    G; A G
    C; A G C
    H; A G C H
    I; A G I
    F; A G F
    B; A G F B
    D; A G F D
    E; A G F E

13. **Strong Components** (3pts)
    1. First component: A, B
    2. Second component: C
    3. Third component: D,E,F,G

14. **Reduction** (4pts)
    1. Answer: d (Promote them all)

15. **Huffman encoding** (4pts)



16. **Hard problem identification** (9 pts)
    1. Answers: A,B,C,E,G