CS106B — Instructor: Cynthia Lee

Autumn 2019 — Solutions

PRACTICE FINAL EXAM 3 - SOLUTIONS

1. Sorting

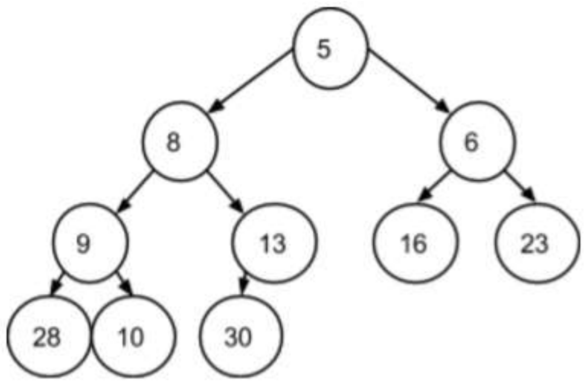
5	6	8	4	2	8	3	7	1
1	6	8	4	2	8	3	7	5
1	2	8	4	6	8	3	7	5
1	2	3	4	6	8	8	7	5
1	2	3	4	6	8	8	7	5
1	2	3	4	5	8	8	7	6
1	2	3	4	5	6	8	7	8
1	2	3	4	5	6	7	8	8
1	2	3	4	5	6	7	8	8
1	2	3	4	5	6	7	8	8

2. BFS/DFS

BFS: All possible full credit solutions:
A, C, D, B, E, H, G, J, F
A, C, D, B, E, H, J, G, F
A, C, D, E, B, H, G, J, F
A, C, D, E, B, H, J, G, F
A, D, C, B, H, E, G, J, F
A, D, C, B, H, E, J, G, F
A, D, C, H, B, E, G, J, F
A, D, C, H, B, E, J, G, F

DFS: All possible full credit solutions:
A, C, B, E, D, H, J, G, F
A, C, B, E, D, H, G, F, J
A, C, E, B, D, H, J, G, F
A, C, E, B, D, H, G, F, J
A, D, H, J, G, F, C, E, B
A, D, H, J, G, F, C, B, E
A, D, H, G, F, J, C, E, B
A, D, H, G, F, J, C, B, E

3. Heap



```
Circle: YES
```

4. BST

Diagram after inserting (25,2): (25,2) *This one is completed for you as a node formatting example.*	Diagram after inserting (5,5): (25, 2) / (5,5)
Diagram after inserting (19,3): (25, 2) / (5,5) \\ (19,3)	Diagram after inserting (5,12): (25, 2) / (5,12) \\ (19,3) 2/2 pts if they update value of 5 regardless of 5's location in the tree
Diagram after inserting (40,5): (25, 2) / \\ (5,12) (40,5) \\ (19,3)	Diagram after inserting (3,1): (25, 2) / \\ (5,12) (40,5) / \\ (3,1) (19,3)

5. ADTs

```
void moveLeft(Grid<int> &board) {
   // For each [row][col], we consider if something from the right
   // should move into this place, and there are two cases of this:
   // (1) if we are non-zero, see if a matching number merges into us
   // (2) if we are blank, see if a number moves into this space
   for (int row = 0; row < board.numRows(); row++) {
      for (int col = 0; col<board.numCols(); col++) {
         // (1) if we are non-zero, see if a matching number merges
         if (board[row][col] != 0) {
            for (int i = col + 1; i < board.numCols(); i++) {
               //matching number: merge
               if (board[row][i] == board[row][col]) {
                  board[row][col] *= 2;
                  board[row][i] = 0;
                  break;
               //non-matching number: end search
               } else if (board[row][i] != 0){
                  break;
               }
            }
         }
         // (2) if we are blank, see if a number moves into this space
         else {
            for (int i = col + 1; i < board.numCols(); i++){
               if (board[row][i] != 0){
                  board[row][col] = board[row][i];
                  board[row][i] = 0;
                  col--;
                  break;
               }
            }
         }
      }
   }
}
```

6. Trees

```
bool isSubtree(Node *tree1, Node *tree2) {
   if (isSame(tree1, tree2)) return true;
   if (tree1 == NULL) return false;
   if (isSubtree(tree1, tree2->left)) return true;
   if (isSubtree(tree1, tree2->right)) return true;
   return false;
}

bool isSame(Node *tree1, Node *tree2) {
   if (tree1 == NULL && tree2 == NULL) return true;
   if (tree1 == NULL || tree2 == NULL) return false;
   if (tree1->value != tree2->value) return false;
   return isSame(tree1->left, tree2->left) && isSame(tree1->right, tree2->right);
}
```