

# CSE 202 Midterm 3

Olcay Taner YILDIZ

## I. QUESTION (DISJOINT SET) (15 POINTS)

Given the index of a set, write a function that returns the indexes of its grandchildren as a linked list.

```
LinkedList grandchildren(int index)
```

## II. QUESTION (DISJOINT SET) (15 POINTS)

Given the index of a set, write a function that unmerges (creates disjoint sets of) it.

```
void unmerge(int index)
```

## III. QUESTION (HEAP) (15 POINTS)

Given the index of a heap node, write a recursive function that returns the number of descendants of that heap node.

```
int descendants(int no)
```

## IV. QUESTION (*d*-HEAP) (20 POINTS)

Given the index of a *d*-heap node, write a function that returns the maximum child of this node.

```
HeapNode largestChild(int no)
```

## V. QUESTION (GRAPH) (20 POINTS)

A node in a graph is said to be an *island* if there are no incoming edges to it and no outgoing edges from it. Given the adjacency list representation of a directed graph  $G$ , write a function that calculates the number of islands in that graph.

```
int islands()
```

## VI. QUESTION (GRAPH) (15 POINTS)

Given the adjacency matrix representation of a graph  $G$ , return the incoming nodes to a given node  $i$  as a linked list.

```
LinkedList incomingNodes(int i)
```