

CSE 202 Midterm 3

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I. QUESTION (HEAP) (20 POINTS)

Given the index of a heap node, write a method to determine the depth of that node. Depth of root node is 1, depth of second level nodes are 2, etc.

```
int depthOfHeapNode(int index)
```

II. QUESTION (HEAP) (15 POINTS)

Given the index of a heap node, write a method which swaps that node with its smallest child. If the node has no children, the method will do nothing.

```
void swapWithSmallestChild(int index)
```

III. QUESTION (DISJOINT SET) (15 POINTS)

Write a function which finds the number of children of a disjoint set node given its index.

```
int numberOfChildren(int index)
```

IV. QUESTION (DISJOINT SET) (15 POINTS)

Write a function which returns the sum of all predecessor nodes of a disjoint set node. The function will return 0 for the root nodes.

```
int sumOfPredecessors()
```

V. QUESTION (GRAPH) (20 POINTS)

Write a method to find the degree of a node given its index. You should write the code for adjacency list representation. The degree of a node is the sum of the number of edges that are coming/going from/to that node.

```
int degree(int index)
```

VI. QUESTION (GRAPH) (15 POINTS)

Write a method to find the number of edges of a graph. You should write the code for adjacency matrix representation.

```
int numberOfEdges()
```