992 Practical Data Structures and Algorithms
Final
June 24, 2011

1. (15%) Prove that, if a connected graph of N nodes has the property that removing any edge disconnects the graph, then the graph has $N - 1$ edges and no cycles.
2. (20%) Describe what the *cut property* is. Use the *cut property* to prove how Kruskal's algorithm guarantees to produce a minimum spanning tree.
3. (15%) Write down the basic idea of a program that can re-construct a binary tree by using its preorder and inorder traversals.
4. (15%) What is a heap? How can a heap improve the performance of a priority queue when compared with using an array or list implementation?
5. (20%) Please write a recursive function that takes a link to a tree as an argument and calls the function *visit* with each of the nodes in the tree as argument to implement a postorder traversal.

```
void traverse(link h, void visit(link))
  {

  }
```

6. (15%) List one advantage of the quicksort algorithm over mergesort, and vice versa. Based on the empirical study conducted in your HW8, which one is faster?