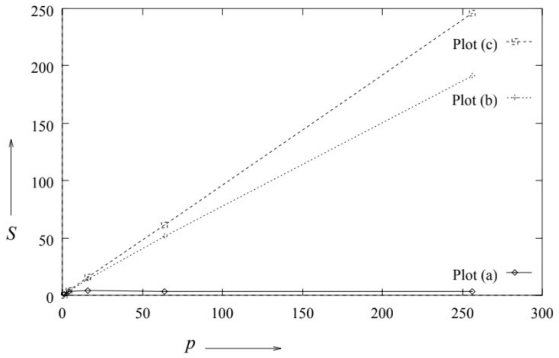
CSE 531
Homework-3 Solution

1. The speedup is formulated as $S=\frac{W}{W_S}=\frac{W}{W_S+\frac{W-W_S}{p}}$. Thus, as p increases, the fraction $\frac{W-W_S}{p}$ approaches zero. However, no matter how large p is, S cannot exceed $\frac{W}{W_S}$.

2. Plot(a): (standard speedup); Plot(b): scaled speed; Plot(c): isoefficiency



3. Since every time we traverse the binary tree needs to lock the root node, a moderate number of threads could be throttled by the single recursive lock.

```
1   search_tree(void *tree_ptr)
2   {
3       struct node *node_pointer;
4       node_pointer = (struct node *) tree_ptr;
5       pthread_mutex_lock(&tree_lock);
6       if (is_search_node(node_pointer) == 1) {
7           /* solution is found here */
8           print_node(node_pointer);
9           pthread_mutex_unlock(&tree_lock);
10          return(1);
11      }
12      else {
13          if (tree_ptr -> left != NULL)
14              search_tree((void *) tree_ptr -> left);
15          if (tree_ptr -> right != NULL)
16              search_tree((void *) tree_ptr -> right);
17      }
18      printf("Search unsuccessful\n");
19      pthread_mutex_unlock(&tree_lock);
20  }
```