Problem 1

- (1) D
- (2) 2
- (3) $k = 5$
- (4) $f(n) = O(g(n))$
- (5) $S = 1536$
- (6) Number of swap is 8
- (7) $[1, 2, 7, 8, 9, 6, 3, 4, 5]$

(8) Height of the node is the longest path or number of edges from the node to the children. Denote the height as h(N) where N is the node.

$$h(N) = \begin{cases} 0 \text{ if N is a leaf node} \\ 1 + \max(h(\text{N's left child node}), h(\text{N's right child node})) \end{cases}$$

Depth of the node is the longest path or number of edges from the root to the node. Denote the depth as d(N) where N is the node.

$$d(N) = \begin{cases} 0 \text{ if N is the root node} \\ 1 + d(\text{N's parent node}) \end{cases}$$