Exercise 1 – Binary Search Trees and LLRBs

A. Label each node in the following binary tree with numbers from the set 2, 26, 10, 27, 20, 15, 42 so that it is a legal Binary Search Tree.

B. Now label each edge in the figure with r or b, denoting RED and BLACK, so that the tree is a legal Left-Leaning Red-Black Tree.

C. Argue that it is not possible to assign different red/black labels and still satisfy the LLRB-tree conditions.
Exercise 2
Algorithm Design Question

A. An array $b$ is called a Circular Shift of array $a$, if $b$ is obtained by rotating a sorted array $a$ clockwise as shown below.

1. Assume that the array $b$ consists of $N$ comparable keys, no two of which are equal. Array $a$ is not provided. Design an efficient algorithm to determine the minimum value of array $a$. Briefly describe your algorithm, using crisp and concise prose.

2. Design an efficient algorithm to find any given key in array $b$. You can use your algorithm in part (a) to help solve this problem. Briefly describe your algorithm, using crisp and concise prose.