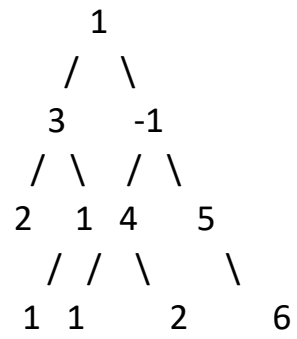
Print all k-sum paths in a binary tree

A binary tree and a number k are given. Print every path in the tree with sum of the nodes in the path as k.
A path can start from any node and end at any node and must be downward only, i.e. they need not be root node and leaf node; and negative numbers can also be there in the tree.

Examples:

Input : k = 5
Root of below binary tree:



Output :
3 2
3 1 1
1 3 1
4 1
1 -1 4 1
-1 4 2
5
1 -1 5

Kindly note that this problem is significantly different from finding k-sum path from root to leaves. Here each node can be treated as root, hence the path can start and end at any node.

Approach:
The basic idea to solve the problem is to do a preorder traversal of the given tree. We also need a container (vector) to keep track of the path that led to that node. At each node we check if there are any path that sums to k, if any we print the path and proceed recursively to print each path.

```
def printVector(v, i):
    for j in range(i, len(v)):
        print(v[j], end=" ")
    print()


# Binary Tree Node
""" utility that allocates a newNode
with the given key """


class newNode:

    # Construct to create a newNode
    def __init__(self, key):
        self.data = key
        self.left = None
        self.right = None

# This function prints all paths
# that have sum k


def printKPathUtil(root, path, k):

    # empty node
    if (not root):
        return

    # add current node to the path
    path.append(root.data)

    # check if there's any k sum path
    # in the left sub-tree.
    printKPathUtil(root.left, path, k)

    # check if there's any k sum path
    # in the right sub-tree.
    printKPathUtil(root.right, path, k)

    # check if there's any k sum path that
    # terminates at this node
    # Traverse the entire path as
    # there can be negative elements too
    f = 0
    for j in range(len(path) - 1, -1, -1):
        f += path[j]

        # If path sum is k, print the path
```

```
        if (f == k):
            printVector(path, j)

    # Remove the current element
    # from the path
    path.pop(-1)

# A wrapper over printKPathUtil()


def printKPath(root, k):

    path = []
    printKPathUtil(root, path, k)


# Driver Code
if __name__ == '__main__':

    root = newNode(1)
    root.left = newNode(3)
    root.left.left = newNode(2)
    root.left.right = newNode(1)
    root.left.right.left = newNode(1)
    root.right = newNode(-1)
    root.right.left = newNode(4)
    root.right.left.left = newNode(1)
    root.right.left.right = newNode(2)
    root.right.right = newNode(5)
    root.right.right.right = newNode(2)

    k = 5
    printKPath(root, k)
```