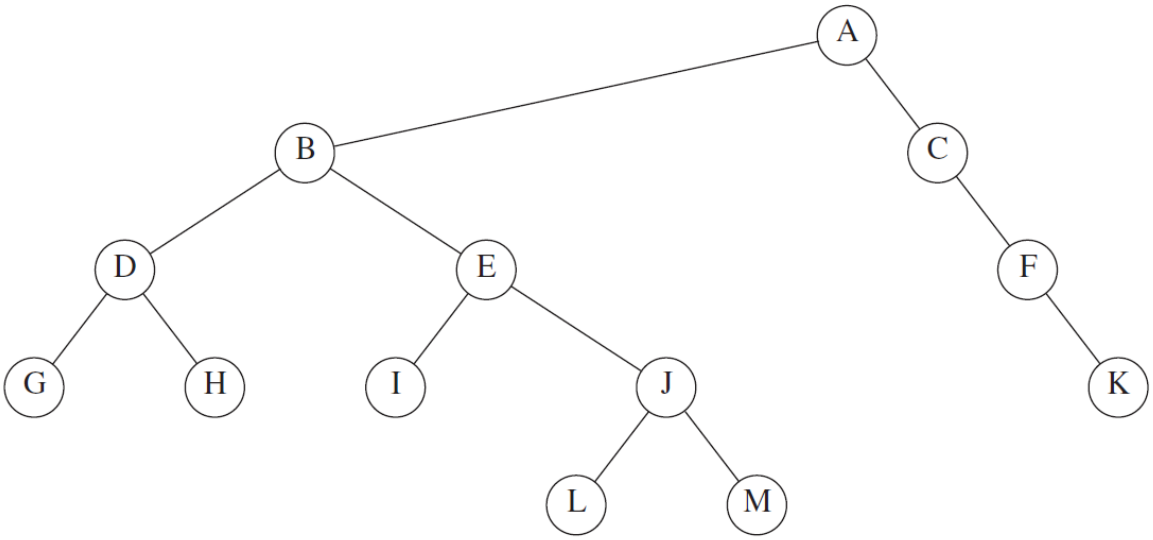
Exercises: Introduction to Trees

Exercise 1

a. Which node is the root?

b. Which nodes are leaves?

c. What is the depth of the tree?



Exercise 2

a. Show the result of inserting 3, 1, 4, 6, 9, 2, 5, 7 into an initially empty binary search tree.

b. Show the result of deleting the root.

Exercise 3

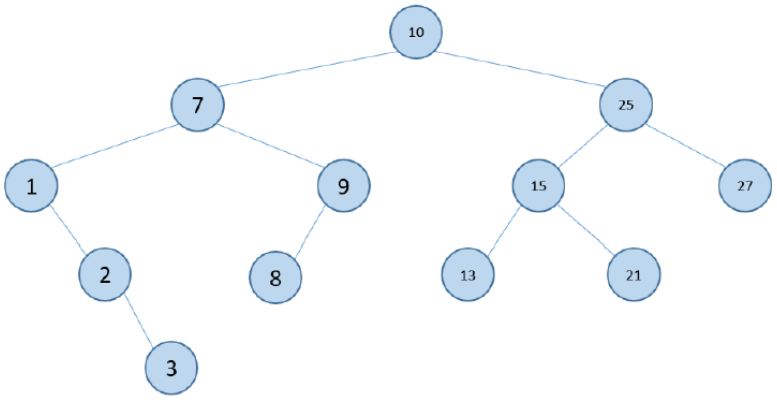
Consider the binary tree below. Write the sequences of numbers resulting from doing a:

a. Pre-order traversal

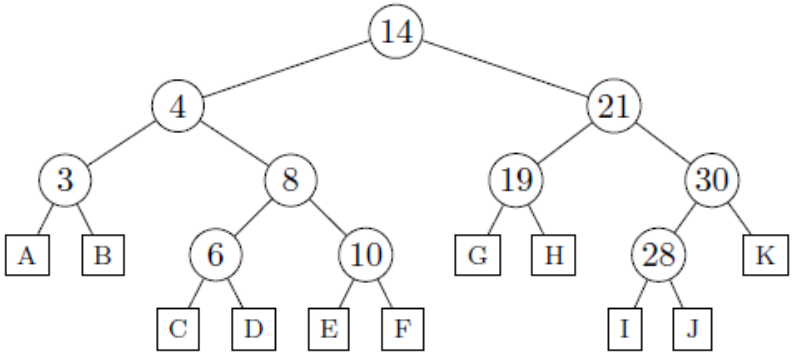
b. In-order traversal

c. Post-order traversal

d. Level order traversal (BFT)



Exercise 4

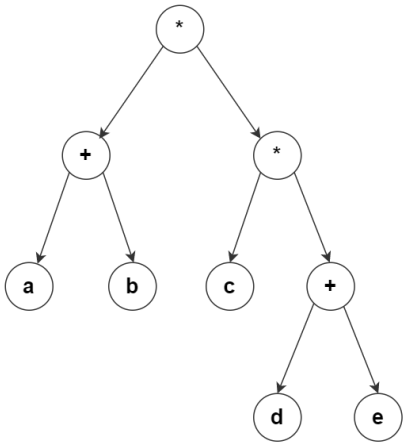


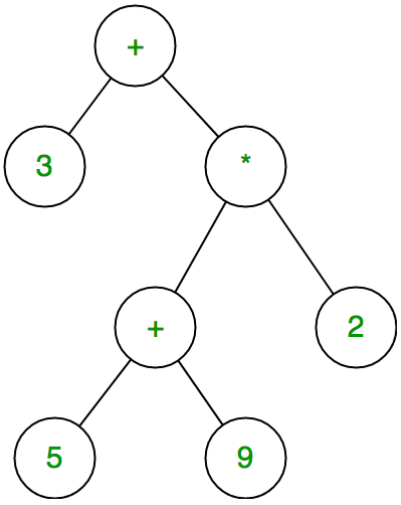
In which leaf A-K in the above unbalanced binary tree should we insert 24, 2, 25, 15 and 5 (assume that for each insertion, the tree only contains the above 10 elements):

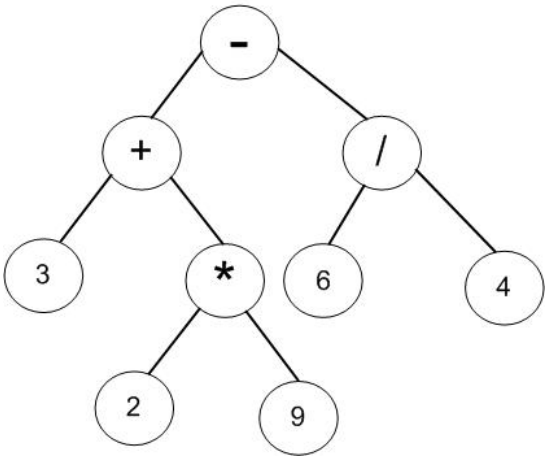
	A	B	C	D	E	F	G	H	I	J	K
INSERT(24)	A	B	C	D	E	F	G	H	I	J	K
INSERT(2)	A	B	C	D	E	F	G	H	I	J	K
INSERT(25)	A	B	C	D	E	F	G	H	I	J	K
INSERT(15)	A	B	C	D	E	F	G	H	I	J	K
INSERT(5)	A	B	C	D	E	F	G	H	I	J	K

Exercise 5

Below are shown 3 expression trees. For each of these, write the result from doing an in-order traversal. For the trees whose nodes are numbers, calculate the resulting number (be aware that the order of operations are determined by the tree!)

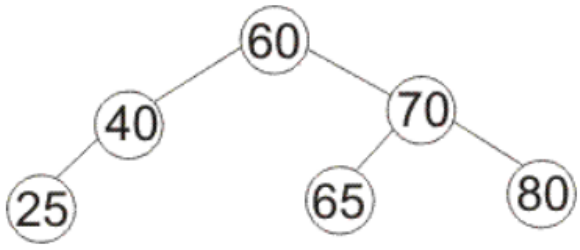




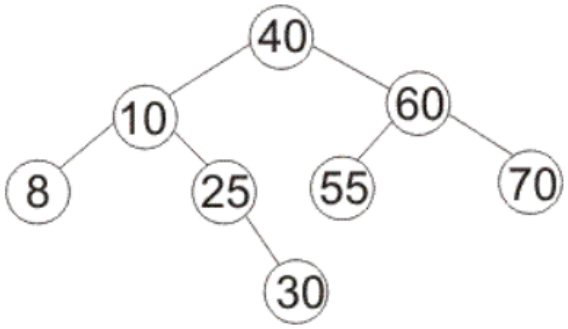


Exercise 6

a. If you insert 26 into the following binary search tree using the algorithm that keeps the tree height-balanced by doing rotations, what tree do you get?



b. If you insert 27 into the following binary search tree using the algorithm that keeps the tree height-balanced by doing rotations, what tree do you get?



c. If you remove 40 from the following binary search tree using the algorithm that keeps the tree height-balanced by doing rotations, what tree do you get?