# 3.1. Paper Assignment

## A diagram of a network Description automatically generated1. Given an sequence of numbers from 1 to 10. Draw a binary search tree with minimum height.

## A diagram of a diagram Description automatically generated2. Draw an AVL tree of height 4 that contains the minimum possible number of nodes.

## 3. Give an example For each type of imbalance (left-left, right-right, left-right, right-left imbalances). Draw an AVL tree at each case and write the sequence of numbers to create that tree.

A diagram of a line with circles and numbers

Description automatically generatedLeft-Left Imbalance:

Sequence of Numbers: 3, 2, 1

A diagram of a line with circles and numbers

Description automatically generatedRight-Right Imbalance:

Sequence of Numbers: 1, 2, 3

A diagram of a network

Description automatically generatedLeft-Right Imbalance

Sequence of Numbers: 3, 1, 2

A diagram of a network

Description automatically generatedRight-Left Imbalance

Sequence of Numbers: 1, 3, 2

## A diagram of a network Description automatically generatedGiven the following AVL tree:

### a. What values could you insert to cause a right-right imbalance, and at which node does the imbalance occur?

We can insert value 31 and the tree will be right-right imbalance. The imbalance occurs at node 10.

### b. How about a right-left imbalance? At which node does the imbalance occur?

We can insert value 12 and the tree will be right-left imbalance. The imbalance occurs at node 10.

### c. Insert 18 into the following AVL tree. What type of imbalance does it cause? Show the result after balancing.

After insert 18 into the tree, it will cause the right-left imbalance.

A diagram of a network

Description automatically generatedThe tree after balancing:

## A diagram of a network Description automatically generatedA diagram of a network Description automatically generatedDraw an AVL tree when we insert list of numbers as follow : 74, 12, 217, 36, 61, 77, 286, 153, 337, 93, 121, 47, 463, 248 and 146 into the tree one by one.

A diagram of a network

Description automatically generated

A diagram of a tree

Description automatically generated