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Batch 3

ADS LAB

AVL Trees

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Insertion:

```
struct node* insert (struct node *r , int data)
{
  if (r= = NULL)
  {
    struct node *n;
    n = new struct node ;
    n->data = data;
    r=n;
    r -> left = r -> right = NULL;
    r -> height = 1;
    return r;
  }
  else
  {
    if (data < r->data)
        r->left= insert (r->left, data);
    else
        r->right = insert (r->right, data);
  }
  r -> height = calheight (r);
  if (bf(r) = =2 && bf(r-> left) = =1)
    r=llrotation (r);
  else if (bf(r) == -2 && bf(r->right) == -1)
      r= rrrotation (r);
  else if (bf(r) == -2 && bf(r-> right) = = 1)
      r= rlrotation (r);
  else if (bf(r) == 2 && bf (r->left) == -1)
      r= lrrotation (r);
  return r;
}
```

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Deletion

```
struct node* deleteNode(struct node *p, int data)
{
   if (p->left == NULL && p->right == NULL)
    { if(p== this->root
              this->root = NULL;
       delete p;
       return NULL;
    }
     struct node *t;
        struct node *q;
     if (p->data <data)
        p->right = deleteNode (p->right, data);
     else if (p->data > data)
        p->left = deleteNode (p->left ,data);

     else {
          if(p->left != NULL) {
               q = inpre (p->left);
               p->data = q->data;
               p-> left =deleteNode(p->left , q->data);
          }
          else { q = insuc(p->right);
                 p->data = q->data;
                 p->right = deleteNode (p->right, q ->data);

               }
          }
      if (bf (p) == 2 && bf (p->left) == 1)
             p = LLrotation(p);
      else if ( bf(p) == 2 && bf(p->left)== -1)
             p= LRrotation (p);
        else if (bf(p) == 2 && bf(p->left) == 0)
              p = llrotation(p);
        else if (bf(p) == -2 && bf(p->right) == -1)
              p = rrrotation(p);
        else if (bf(p) == -2 && bf(p->right) == 1)
              p = rl rotation (p);
        else if (bf(p) == -2 && bf(p->right) == 0)
              p = llrotation (p);

     return p;

}
```