DSA assignment Day-4

1.)In the Binary Search algorithm, it is suggested to calculate the mid as beg + (end - beg) / 2 instead of (beg + end) / 2. Why is it so?

Answer:-

beg + (end - beg) / 2, This formula is used to avoid the overflow problem. There's no guarantee that beg+end is representable; but in the second case the intermediate values, as well as the expected result, are no larger than the end, so there is no danger of overflow.

2.) Write the algorithm/function for Ternary Search.

Answer:-

i) recursive solution

```
int ternary_search(int arr[],int beg,int end,int k)
{
        if(beg <= end)
        {
        int mid1 = beg+(end-beg)/3;
        int mid2 = end-(end-beg)/3;
        if(arr[mid1] == k)
            return mid1;
        if(arr[mid2] == k)
            return mid2;
        if(arr[mid1]>k)
             return ternary_search(arr,beg,mid1-1,k);
        else if(arr[mid2]<k)
              return ternary_search(arr,mid2+1,end,k);
        else
               return ternary_search(arr,mid1+1,mid2-1,k);
        }
        return -1;
}
```

ii) iterative solution

```
int ternary_search(int arr[],int n,int k)
{
	int mid1,mid2,res1=-1,beg =0, end = n-1;
	while(beg<=end)
	{
	mid1 = beg+(end-beg)/3;
	mid2 = end-(end-beg)/3;
	if(arr[mid1] == k)
	{
		res1 = mid1;
		break;
	}
	if(arr[mid2] == k)
	{
		res1 = mid2;
		break;
	}
	if(arr[mid1]>k)
	end = mid1-1;
	else if(arr[mid2]<k)
	beg = mid2+1;
	else
	{
		beg = mid1+1;
		end = mid2-1;
	}
	}
	return res1;
}
```