Talent Battle 100 Days Coding Series

For a given array $B1,B2,\ldots,BM$ of length at least 3, let's define its **weight** as the largest value of $(Bi-Bj)\cdot(Bj-Bk)$ over all possible triples (i,j,k) with $1\le i,j,k\le M$ and $i!=j$, $j!=k$, $k!=i$.

You are given a sorted array $A1,A2,\ldots,AN$ (that is, $A1\le A2\le\ldots\le AN$).

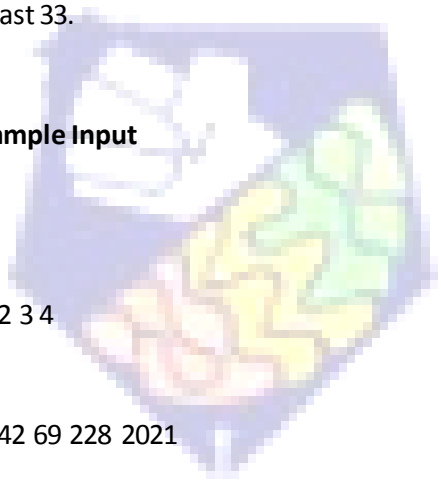
Calculate the sum of weights of all contiguous subarrays of A of length at least 3. That is, count the sum of weights of arrays $[Ai,Ai+1,\ldots,Aj]$ over all $1\le i<j\le N$ with $j-i\ge 2$.

Input Format

- The first line of input contains a single integer T denoting the number of test cases. The description of T test cases follows.
- The first line of each test case contains an integer N.
- The second line of each test case contains N space-separated integers $A1,A2,\ldots,AN$.

Output Format

For each test case, print a single line containing the sum of weights of all subarrays of A of length at least 33.



Sample Input

2

4

1 2 3 4

5

1 42 69 228 2021

Sample Output

4

1041808

C

```
#include<stdio.h>

#include<math.h>

#include<string.h>

#define M 1048576
```

```
#define A 3005
typedef long long (ll);
ll x[64],y[64],z[A],s[1],p[64];

int main()
{
	ll a,b,c,d,e,f,g,h,i,j,k,l,m,n;
	scanf("%lli",&a);
	for(;a;a--)
	{
		scanf("%lli",&b);
		for(c=0;c<b;c++)
		{
			scanf("%lli",&z[c]);
		}
		i=0;
		for(c=0;c<b-2;c++)
		{
			e=c+1;
			for(d=c+2;d<b;d++)
			{
				f=z[d]-z[c];
				f/=2;
				f+=z[c];
				g=z[e]-f;
				if(g<0)g=-g;
				for(;e<d;e++)
				{
					h=z[e]-f;
```

```
                    if(h<0)h=-h;
                    if(h>g)
                    {
                        e--;
                        break;
                    }
                    else
                    {
                        g=h;
                    }
                }
                if(e==d)e--;
                j=z[c]-z[e];
                k=z[e]-z[d];
                l=j*k;
                i+=l;
            }
        }
        printf("%lli\n",i);
    }
}
```

C++

```
#include<bits/stdc++.h>
using namespace std;
long long int wt(long long int i,long long int j,long long int k)
{
   return (long long int)(j-i)*(k-j);
```

```
}

int main()
{

   int t;
   cin>>t;
   while(t--){int n;
   cin>>n;
   long long int A[n];
   for(int i=0;i<n;i++)cin>>A[i];
   long long int sum=0L;
   for(int i=0;i<n;i++)
   {
      for(int j=i+2;j<n;j++)
      {
         long long int k=(A[i]+A[j])/2L;
         auto u =upper_bound(A+i+1,A+j-1,k);
         auto l =u-1;
         sum=sum+max(wt(A[i],*u,A[j]),wt(A[i],*l,A[j]));
      }
   }
   cout<<sum<<"\n";
   }
   return 0;
}
```

Java

```
import java.util.*;
import java.lang.*;
import java.io.*;

class Main
{
   public static void main (String[] args) throws java.lang.Exception
   {
      MyScanner sc = new MyScanner();
      PrintWriter out = new PrintWriter(new BufferedOutputStream(System.out));
      int tt = sc.nextInt();
      while (tt-- > 0) {
         int n = sc.nextInt();
         int [] a = new int[n];
         TreeSet<Integer> set = new TreeSet<>();
         for (int i = 0; i < n; i++) {
            a[i] = sc.nextInt();
            set.add(a[i]);
         }
         long ans = 0;
         for (int i = 0; i < n; i++) {
            for (int j = i + 2; j < n; j++) {
               int s = a[i];
               int e = a[j];
               int mean = (s + e) / 2;
               long res = 0;
               Integer lo = set.lower(mean);
```

```
            if (lo != null) {
                res = Math.max(res, multiply(e - lo, lo - s));
            }
            Integer hi = set.higher(mean);
            if (hi != null) {
                res = Math.max(res, multiply(e - hi, hi - s));
            }
            if (set.contains(mean)) {
                res = Math.max(res, multiply(e - mean, mean - s));
            }
            ans += res;
        }
      }
      out.println(ans);
    }
    out.close();
}

static long multiply(int x, int y) {
    return (long) x * (long) y;
}

static void sort(long[] a) {
    ArrayList<Long> q = new ArrayList<>();
    for (long i : a) q.add(i);
    Collections.sort(q);
    for (int i = 0; i < a.length; i++) a[i] = q.get(i);
}
```

```
public static class MyScanner {
 BufferedReader br;
 StringTokenizer st;

 public MyScanner() {
    br = new BufferedReader(new InputStreamReader(System.in));
 }

 String next() {
    while (st == null || !st.hasMoreElements()) {
       try {
          st = new StringTokenizer(br.readLine());
       } catch (IOException e) {
          e.printStackTrace();
       }
    }
    return st.nextToken();
 }

 int nextInt() {
    return Integer.parseInt(next());
 }

 long nextLong() {
    return Long.parseLong(next());
 }

 double nextDouble() {
    return Double.parseDouble(next());
```

```
        }

        String nextLine(){
            String str = "";
            try {
                str = br.readLine();
            } catch (IOException e) {
                e.printStackTrace();
            }
            return str;
        }
    }

}
```


Python

```
def compute(arr):
    n = len(arr);total = 0
    for i in range(n - 2):
        j = i + 1
        for k in range(i + 2, n):
            mid = (arr[i] + arr[k]) / 2
            while (j < (k - 1)) and abs(arr[j + 1] - mid) <= abs(arr[j] - mid):j += 1
            total += (arr[i] - arr[j]) * (arr[j] - arr[k])
    return total
for t in range(int(input())):n = int(input());print(compute(list(map(int, input().split()))))
```