Array

```
main()
{  int x[20],sum,i,n;
   printf("How many numbers");
   scanf("%d",&n);
   for (i=1;i<=n;i++)
   {  printf("Give %dth number",i);
      scanf("%d",&x[i]);
   }
   sum=0;
   for (i=1;i<=n-1;i++)
      sum=sum+x[i]*x[i+1];
   printf("%d",sum);
}
```

The given program reads n and finds the sum of product of consecutive numbers. If n=7 and numbers are 4,5,2,5,6,4,7 then output is 4*5+5*2+2*5+5*6+6*4+4*7=122.

Modify the above program to print the value of following expressions.

1. $(x_1 + x_2)*x_3 + (x_2 + x_3)*x_4 + (x_3 + x_4)*x_5 + \ldots$ For above input answer is answer is 209.
2. $(x_1 + x_3)*(x_2 + x_4)*(x_3 + x_5)* \ldots$ answer 56160.
3. $(x_1 - x_2)*(x_2 + x_3) + (x_2 - x_3)*(x_3 + x_4) + \ldots + (x_{n-2} - x_{n-1}) *(x_{n-1} + x_n)$ answer -7.

4. Write a C program, which outputs all local maximums of a given data of elements. A number x_i is a local maximum if it is more than both x_{i-1} and x_{i+1}. If the elements are 25, 19, 22, 23, 21, 12, 10, 17, 11, 13, 10 then 23, 17 and 13 are local maximums.
5. Write a C program that outputs the smallest 'i' such that x_i is even. For example, 22 is the output for the input 25, 19, 22, 23, 21, 12, 10, 17, 11, 13, 10
6. Write a C program that outputs the smallest 'i' such that x_i and x_{i+1} are both even. In above case 6. (Because 12 and 10 are even).
7. Let $A[1 \ldots n]$ be an array of n integers. Define an operation called $Swap(A[0], y)$, where the operation swap ony swaps with the first element of the array. Using this swap operation, re-arrange the elements of the array in such a way that the elements are in non-decreasing order of their values. Can we show that the parameter $A[0]$ can be replaced with $A[i]$ for any $i, 1 \le i \le n$ and still be able to arrange the elements in non-decreasing order?
8. Let $A[1 \ldots n]$ be an array of integers and let k be a number. Write a program to check if the sum of any two numbers in A is equal to k.
9. Given an number k write a program to find the number of '0's in k.
10. Given an number k and a digit d, write a program to
    a. check if d occurs in k
    b. output the number of times d occurs in k
    c. output the exact position(s) at which d occurin k.
11. Assume that the given matrix is a square matrix. Write program to print oth the diagonal elements. Optiize on the code to use lesser loop statements, lesser conditional statements. e.g.

Matrix   5 7 9 4
               2 4 7 3
               1 5 9 2
               3 7 4 8

   Output 5 4 9 8
           4 7 5 3

12.