



Lab - 2

1. **Using linked list**, write a program to add, subtract and evaluate polynomials: $P_1(x)$, $P_2(x)$, $P_3(x)$ and $P_4(x)$ where $P_1(x)$ and $P_2(x)$ are input polynomials and $P_3(x) = P_1(x) + P_2(x)$ and $P_4(x) = P_1(x) - P_2(x)$. Each node in the linked list correspond to a term in the polynomial. So, in your node structure - you may keep two data components – integers pow and coeff; and one pointer to the next node.

Input Format: First line mentions K i.e. the number of test cases. Then there are three lines for each test case, In the first two lines of a test case, First number indicate the highest degree of polynomials N and then there are N+1 integers which are the coefficients of polynomial terms in descending order. In the third (and last line) of a test case, there is one integer i.e. value of x for which you need to evaluate the polynomials. (Constraints: $0 \leq K \leq 50$, $0 \leq N \leq 9$, $-2 \leq x \leq 2$, and Input coefficient terms would be between -100 to +100; Assume you can safely do calculations for each polynomial term without worrying about underflow/overflow issues).

Sample Input 1:

```
1
7 1 0 0 0 10 -3 0 1
3 4 0 0 -2
2
```

Explanation of Input Format (Considering 2nd Polynomial mentioned above)

3	4	0	0	-2
Highest degree of polynomial	Coefficient of x^3	Coeff of x^2	Coeff of x^1	Coeff of x^0

$$7 \ 1 \ 0 \ 0 \ 0 \ 10 \ -3 \ 0 \ 1 \longrightarrow x^7 + 10x^3 - 3x^2 + 1$$

$$3 \ 4 \ 0 \ 0 \ 2 \longrightarrow 4x^2 - 2$$

$$2 \longrightarrow \text{value of } x \text{ should be in range of } -2 \text{ to } 2.$$

Sample Output 1:

```
P1(x) : 1x^7 + 10x^3 - 3x^2 + 1
P2(x) : 4x^3 - 2
P3(x) = P1(x) + P2(x) : 1x^7 + 14x^3 - 3x^2 - 1
P4(x) = P1(x) - P2(x) : 1x^7 + 6x^3 - 3x^2 + 3
P1(2) = 197
P2(2) = 30
P3(2) = 227
P4(2) = 167
```