Application of Linked List:

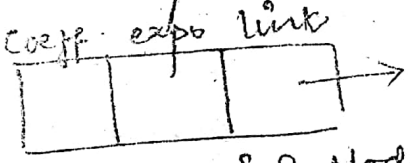
Addition of 2 polynomials :-

Linked lists are widely used to represent and manipulate polynomials. Polynomials are the expressions containing no. of terms with Non zero coefficients and exponents.

Consider the following polynomial

$$p(x) = a_n x_n^{e_n} + a_{n-1} x_{n-1}^{e_{n-1}} + \cdots + a_1 x^{e_1} + a$$

Where a_i are non zero coeffs:
e_i are exponents.



Polynomial Node

```
struct polynode
{
    int coeff;
    int expo;
    struct polynode * link;
};
```

Add" of 2 polynomials:

Steps involved in adding 2 polynomials are :-

1) Read the no. of terms in first polynomial p.
2) Read the coeff & exponents of the first polynomial p.
3) Read the no. of terms in the second polynomial q
4) Read the coeffs & exponents of the second polynomial.

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(5) Set the temporary pointers p1 & q1 to traverse the 2 polynomials respectively.

a) If both exponents are equal then add the coeff & store it in the resultant linked list.

b) If the exponent of the current term in the first polynomial p is less than the exponent of the current term of the second polynomial it is added to the resultant linked list. Move the pointer q1 to point to the next node in the second polynomial q.

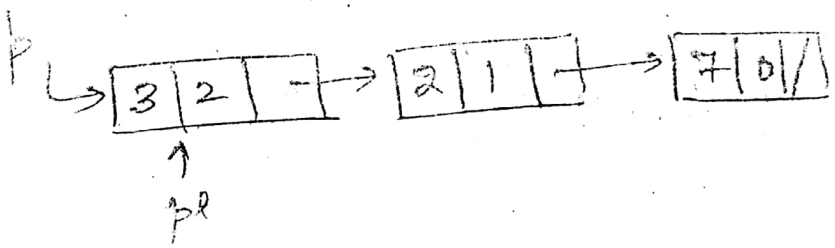
c) If the exponent of the current term in the first polynomial p is greater than the exponent of the current term of the first polynomial q then the current term of the first polynomial is added to the resultant linked list. Move the pointer p1 to the next node.

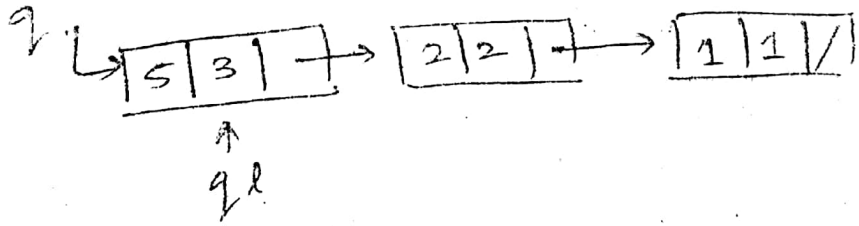
(d) Append the remaining nodes of either of the polynomials to the resultant linked list.

Example

$p = 3x^2 + 2x + 7$

$q = 5x^3 + 2x^2 + x$





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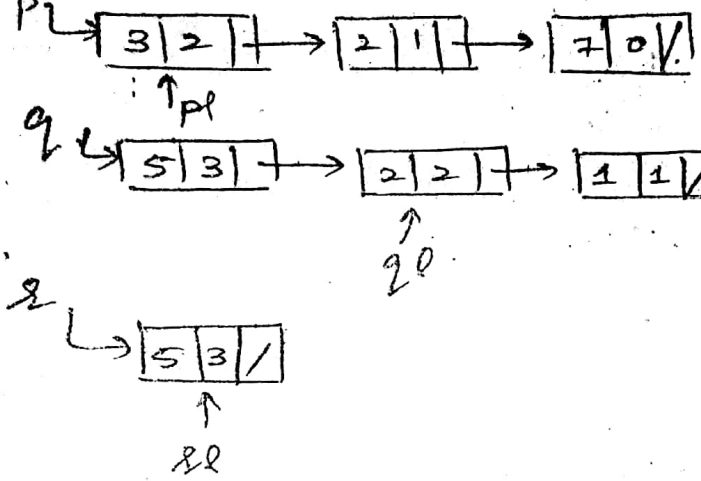
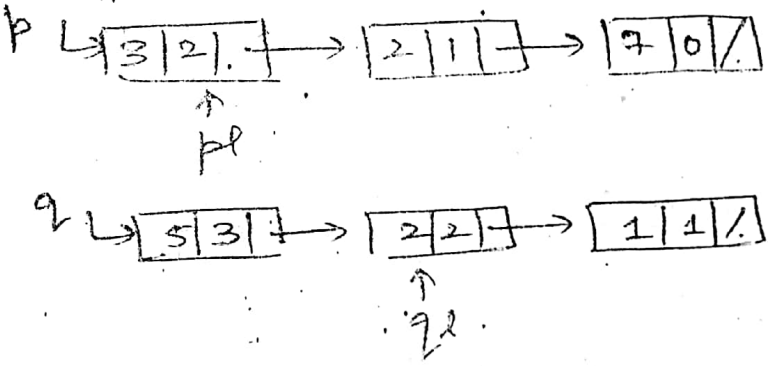
Step 1 :

expo(p1) < expo(q1)



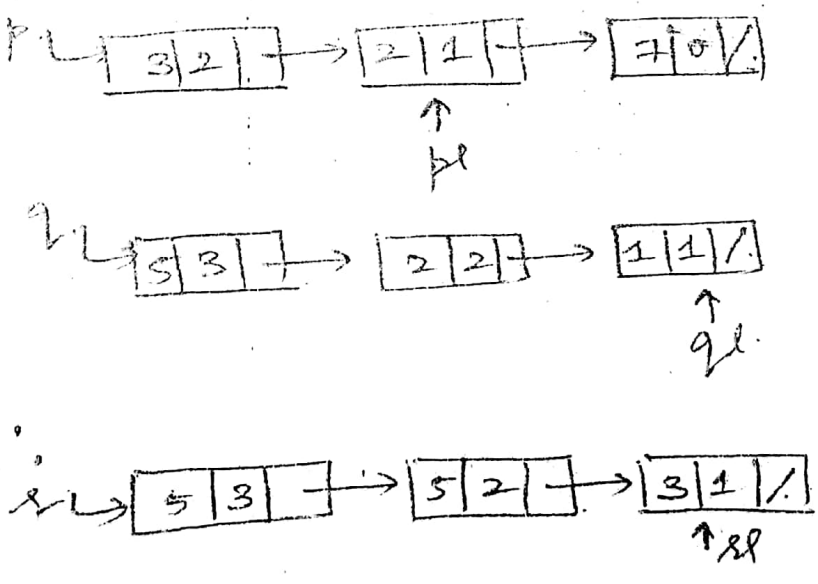
Step 2 :

expo(p1) = expo(q1)



Step 3 :

expo(p1) = expo(q1)



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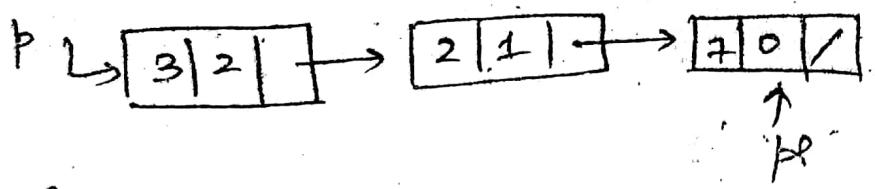
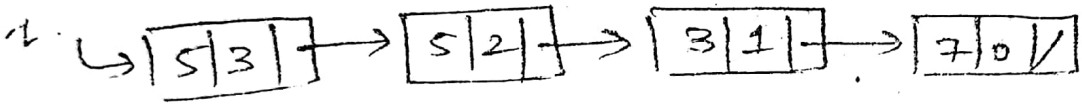
Step 4:



Step 5:



∴ final soln is

$r = 5x^3 + 5x^2 + 3x + 7$

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