Section 12 :-

Sparse Matrix and Polynomial using Linked list

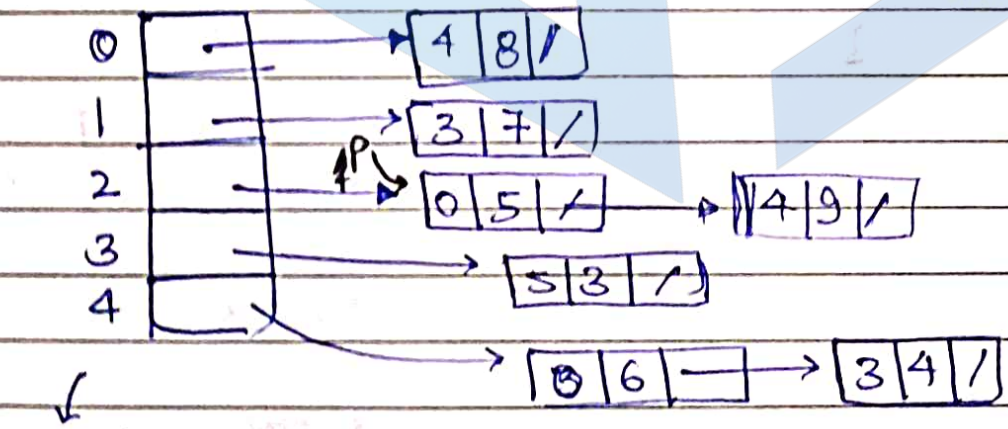
Student challenge :- Sparse Matrix using linked list

	0	1	2	3	4	5
0	0	0	0	0	8	0
1	0	0	0	7	0	0
2	5	0	0	0	9	0
3	0	0	0	0	0	3
4	6	0	0	4	0	0

5 x 6

Avoid storing zeroes

Array A



Array of linked list

rows

5 x 6
m x n

```
Node * A[m];
A[0] = new Node;
```

Node

col	val	next

- Create sparse Matrix
- Display sparse Matrix
- Add sparse Matrix

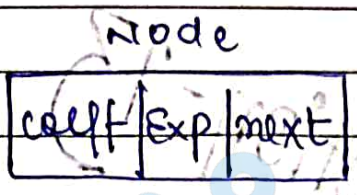
```
Struct Node
{
    int col;
    int val;
    Struct Node *next;
```

Display sparse matrix :-

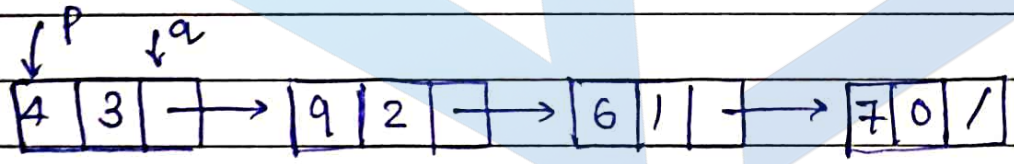
```
for(int i=0; i<m; i++)
{
    p=A[i];
    for(j=0; j<n; j++)
    {
        if(j==p->col)
        {
            cout<<p->val;
            p=p->next;
        }
        else
        {
            cout<<0;
        }
    }
}
```

Student Challenge: Polynomial Representation using Linked list

$$P(x) = 4x^3 + 9x^2 + 6x + 7$$




```
struct Node
{
    int coeff;
    int exp;
    struct Node *next;
};
```



$x = 2;$

```
while(p!=NULL)
double eval(int x)
{
    double sum = 0.0;
    Node *q = p;
    while(q != NULL)
    {
        sum = q->coeff * pow(x, q->exp)
    }   q = q->next;
    return sum;
```