

IE-1 FDS

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Division:- B

Q.1 Write a Program to add and multiply two 2D arrays using pointers.

```
→ #include <iostream>
using namespace std;
int main() {
    int** mat1 = new int*[3];
    int** mat2 = new int*[3];
    for(int i=0; i<3; i++) {
        mat1[i] = new int[3];
        mat2[i] = new int[3];
    }
    cout << "Enter Matrix -1" << endl;
    for(int i=0; i<3; i++) {
        for(int j=0; j<3; j++) {
            cin >> mat1[i][j];
        }
    }
    cout << "Enter Matrix-2\n";
    for(int i=0; i<3; i++) {
        for(int j=0; j<3; j++) {
            cin >> mat2[i][j];
        }
    }
    cout << "Addition = \n";
```

```

for(int i=0; i<3; i++){
    for(int j=0; j<3; j++){
        cout << mat1[i][j] + mat2[i][j] << "\t";
    }
    cout << endl;
}

cout << " Multiplication: \n ";
for(int
int** mat3 = new int* [3];
for(int i=0; i<3; i++){
    mat3[i] = new int [3];
}

for(int i=0; i<3; i++){
    for(int j=0; j<3; j++){
        mat3[i][j] = 0;
        for(int k=0; k<3; k++){
            mat3[i][j] = mat1[i][k] *
                           mat2[k][j];
        }
    }
}

for(int i=0; i<3; i++){
    for(int j=0; j<3; j++){
        cout << mat3[i][j] << "\t";
    }
    cout << endl;
}

} //end of main() function

```

Q.2 What is the sparse matrix? Check whether the following matrix is sparse or not with suitable code.

0	0	2	0
2	0	0	0
0	3	0	0
0	0	1	0

→ A matrix is a two-dimensional data object made of m rows and n columns, therefore having total $m \times n$ values.

If most of the elements of the matrix have 0 value, then it is called a sparse matrix.

In general, if more than half of the elements in a matrix are 0 (zero) then it is a sparse matrix.

To check whether a matrix is sparse or not, we have the following formula:-

if $\frac{\text{no. of rows} \times \text{no. of cols}}{2} < \text{count of zeros}$, then

it is a sparse matrix.

Code to check if the given matrix is sparse or not:-

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int mat[4][4] = { {0, 0, 2, 0},
                      {2, 0, 0, 0},
                      {0, 3, 0, 0},
                      {0, 0, 1, 0} };
```

```
    int count = 0;
```

```
    for (int i=0; i<4; i++) {
```

```
        for (int j=0; j<4; j++) {
```



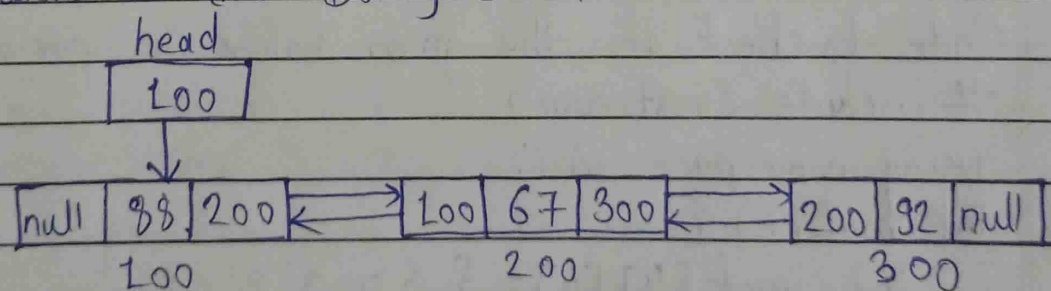
```

    if (mat[i][j] == 0) {
        count++;
    }
}
if (count > (4*4/2)) {
    cout << "This is a sparse matrix";
}
else {
    cout << "This is not a sparse matrix";
}
} //end of main() function.

```

In the given matrix, the count of zeros is 10, which is greater than half of the total number of elements, hence it is a sparse matrix.

Q.3 Write a pseudocode to perform the following questions operations on the Doubly Linked List.



- 1) Insert() 94 at the start of the linked list.
- 2) Insert() 66 after value 67.
- 3) Display data in reverse order.
- 4) Delete() 92 from linked list.

P.T.O.

1) (create new node) newN = new Node;

newN → data = 94;

newN → next = head;

newN → prev = NULL;

head = newN;

2) temp = head → new Node = new Node;
new Node → data = 66

while (temp → data != 67) {

temp = temp → next;

}

temp → next → prev = new Node;

~~temp~~ → new Node → next = temp → next;

new Node → prev = temp;

~~new~~ temp → next = new Node;

3) ~~It's~~ temp = head

while (temp → next != null) {

temp = temp → next;

}

while (temp != null) {

print (temp → data);

temp = temp → prev;

}

4) temp = head;

while (temp → data != 92) {

temp = temp → next;

}

temp → prev → next = temp → next

~~to~~ delete temp