```c
#include <stdio.h>
#include <stdlib.h>

void flipVertical(int **mat, int n, int m){
    int i, j, temp;
    for (i = 0; i < (n/2); i++) {
        for(j = 0; j < m; j++) {
            temp = mat[i][j];
            mat[i][j] = mat[n-1-i][j];
            mat[n-1-i][j] = temp;
        }
    }
}

int main(){
    int n, m, i, j;
    scanf("%d %d", &n, &m);

    // Passing arrays of arrays to functions much easier
    // than passing 2D arrays
    int **a = (int**)malloc(n * sizeof(int*));
    for(i = 0; i < n; i++){
        a[i] = (int*)malloc(m * sizeof(int));
        for(j = 0; j < m; j++)
            scanf("%d", &a[i][j]);
    }

    // First print the matrix with its rows mirrored horizontally
    for(i = 0; i < n; i++){
        // Print the row as is
        for(j = 0; j < m; j++)
            printf("%d ", a[i][j]);
        // Print the row mirrored
        for(j--; j >= 0; j--){
            printf("%d", a[i][j]);
            if(j > 0) printf(" "); // No trailing spaces
        }
        printf("\n");
    }

    flipVertical(a, n, m); // Flip the matrix vertically

    // Do the same as above - print the flipped matrix with
    // its rows mirrored horizontally
    for(i = 0; i < n; i++){
        for(j = 0; j < m; j++)
            printf("%d ", a[i][j]);
        for(j--; j >= 0; j--){
            printf("%d", a[i][j]);
            if(j > 0) printf(" ");
        }
        if(i < n - 1) printf("\n");
    }
    return 0;
}
```