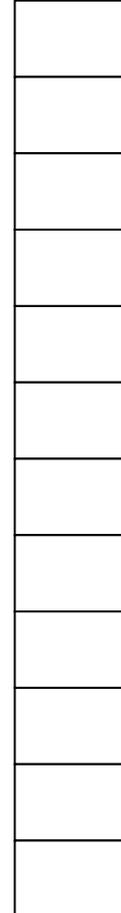


1. Draw this array as it is laid out in memory. Don't forget the row pointers **a[0]**, **a[1]**, and **a[2]**, and the pointer to the array of row pointers, **a**. Also, write the value of each array element itself (**a[i][j]**) where it is stored in memory.

```
int a[3][2] = { {23, 35},  
               {15, 87},  
               {12, 33} };
```



2. Here is a function prototype:

```
int rowSum( int row, int A[ ][ MAXCOLS ], int nc );
```

This function returns the sum of the elements in one row of a 2D array. The row to be summed is given as the first parameter. The array itself is given as the second parameter. The array has at most MAXCOLS number of columns. The number of columns that are actually used is given as the last parameter. Write the definition of this function.

3. Here is a function prototype:

```
int colSum( int col, int A[ ][ MAXCOLS ], int nr );
```

This function returns the sum of the elements in one column of a 2D array. The column to be summed is given as the first parameter. The array itself is given as the second parameter. The array has at most MAXCOLS number of columns. The number of rows that are actually used is given as the last parameter. Write the definition of this function.

4. Here is a function prototype:

```
bool winner( int A[3][3] );
```

It is known in advance that A is a 3x3 array, and all elements of the array are being used (i.e., the entire array is filled in). This function returns **true** if any row or column sum is equal to 3 or equal to 6 ... otherwise it returns **false**. Write the definition of this function.

5. Complete the code below to (1) dynamically allocate a 20 x 12 array of integers named "board", (2) de-allocate it.

```
const int NROW = 20;
const int NCOL = 12;
```

```
int main()
{
    int **board;
    // (1) Dynamically allocate 'board', a 20 x 12 array:
```

```
    // (2) De-allocate the 20 x 12 array named 'board':
```

```
    return 0;
}
```

6. Write the code that would initialize the 'board' array such that every element is zero (0), except for the first and last columns and the last row, which are initialized to one (1).

7. Write a C++ program that tests your answers to questions 2 and 3, using the following arrays (make sure your program tests all rows and columns):

(a)  $\begin{matrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{matrix}$       (b)  $\begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{matrix}$

8. Write a C++ program that tests your answer to question 4 for the following 3 x 3 arrays:

(a)  $\begin{matrix} 1 & 1 & 1 \\ -5 & 2 & -5 \\ -5 & 2 & -5 \end{matrix}$       (b)  $\begin{matrix} 1 & 2 & -5 \\ 1 & 2 & 1 \\ 2 & 2 & 1 \end{matrix}$       (c)  $\begin{matrix} 2 & 2 & 1 \\ 2 & 1 & -5 \\ 1 & -5 & 1 \end{matrix}$

Turn in, stapled together:

- (1) This sheet with your answers to questions 1-6 filled in.
- (2) Hardcopy listing of your answer to questions 7 and 8.