Hugh A. Miles II

09/21/16

UFID: 7868-6913

Section: 13A8

COP3530

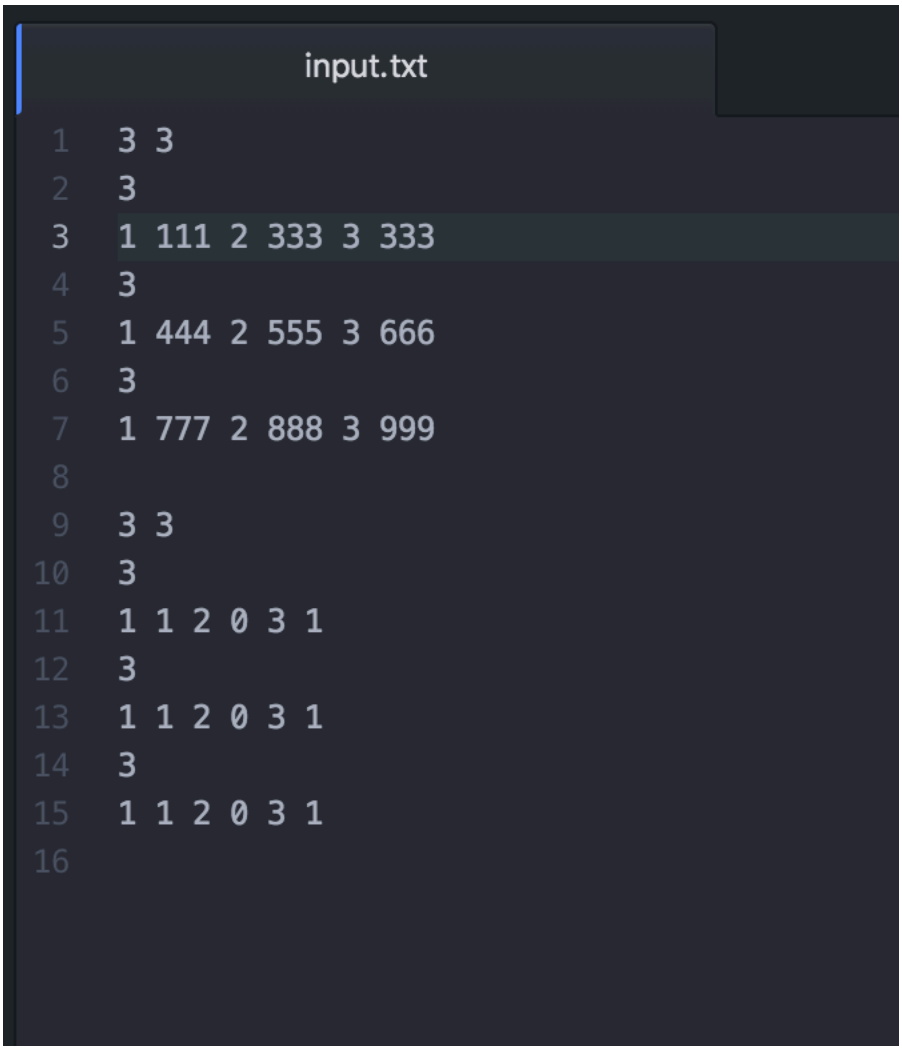
Sparse Matrix

- Summary
    - My Sparse Matrix class incorporates an array of Linked List with the end of each list pointing to NULL. This is a template class so the Nodes can hold any type based upon the type template class at its instantiation. Each node has a value, col, and index.
- Structure
    - Node<type>
        - Constructor (type initValue, int strIndex)
            - In the constructor you need to indicate the value to be set, and where the Node is being placed with the strIndex.
        - Int col
            - Location in the list
        - Type value
            - The data value stored in side the node.
        - Node<type>* nextNode
            - Address for the next Node in the list
    - LinkedList

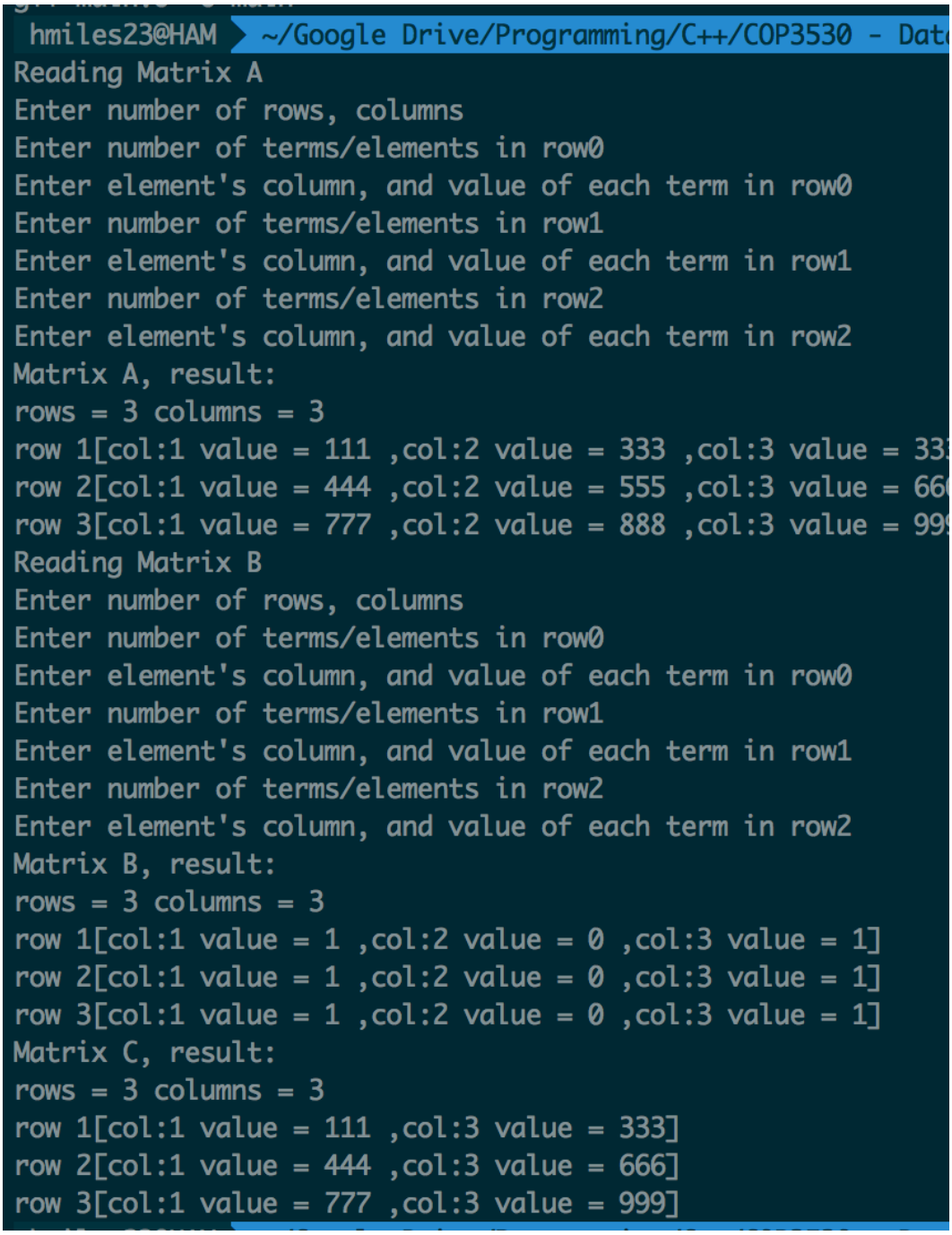
        - Head<type>
            - Pointer to start of the list (index = 0)
        - Int length
            - Keeps track of the number of Nodes in the current list.
    - Sparse Matrix
        - read()
            - read cin for the user to create
        - print()
            - prints the matrix sequentially for nicer reading
        - mask(SparseMatrix<int> b , SparseMatrix <bool> b)
            - takes the b matrix and mask with all its values and with union it fillups matrix with the values needed
        - setRow
            - setter for creating the SparseMatrix rows dynamically
        - setCol
            - setter for col length
- Methods
    - Insert (type value, int index)
        - Allow users to insert element at a certain spot in the current list that is less than the this.length + 1.
    - getNode(int col)
        - Finds the node inside the list with the match col value
    - Print
        - Prints entire list sequentially.

- Helper Methods
  - Append(type value)
    - Adds node with the value to the end of the list

- Test Cases
  - Small
    - Input



- Output


hmiles23@HAM ~/Google Drive/Programming/C++/COP3530 - Dat
Reading Matrix A
Enter number of rows, columns
Enter number of terms/elements in row0
Enter element's column, and value of each term in row0
Enter number of terms/elements in row1
Enter element's column, and value of each term in row1
Enter number of terms/elements in row2
Enter element's column, and value of each term in row2
Matrix A, result:
rows = 3 columns = 3
row 1[col:1 value = 111 ,col:2 value = 333 ,col:3 value = 33
row 2[col:1 value = 444 ,col:2 value = 555 ,col:3 value = 66
row 3[col:1 value = 777 ,col:2 value = 888 ,col:3 value = 99
Reading Matrix B
Enter number of rows, columns
Enter number of terms/elements in row0
Enter element's column, and value of each term in row0
Enter number of terms/elements in row1
Enter element's column, and value of each term in row1
Enter number of terms/elements in row2
Enter element's column, and value of each term in row2
Matrix B, result:
rows = 3 columns = 3
row 1[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 1]
row 2[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 1]
row 3[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 1]
Matrix C, result:
rows = 3 columns = 3
row 1[col:1 value = 111 ,col:3 value = 333]
row 2[col:1 value = 444 ,col:3 value = 666]
row 3[col:1 value = 777 ,col:3 value = 999]

- Big
    - Input

input.txt | inputTri.txt | inputBig.txt

```
10 10
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010

10 10
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
10
1 1 2 0 3 0 4 0 5 1 6 0 7 0 8 0 9 0 10 1
```

- Output

```
Enter element's column, and value of each term in row5
Enter number of terms/elements in row6
Enter element's column, and value of each term in row6
Enter number of terms/elements in row7
Enter element's column, and value of each term in row7
Enter number of terms/elements in row8
Enter element's column, and value of each term in row8
Enter number of terms/elements in row9
Enter element's column, and value of each term in row9
Matrix A, result:
rows = 10 columns = 10
row 1[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 2[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 3[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 4[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 5[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 6[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 7[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 8[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 9[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
row 10[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666 ,col:7 value =
Reading Matrix B
Enter number of rows, columns
Enter number of terms/elements in row0
Enter element's column, and value of each term in row0
Enter number of terms/elements in row1
Enter element's column, and value of each term in row1
Enter number of terms/elements in row2
Enter element's column, and value of each term in row2
Enter number of terms/elements in row3
Enter element's column, and value of each term in row3
Enter number of terms/elements in row4
Enter element's column, and value of each term in row4
Enter number of terms/elements in row5
Enter element's column, and value of each term in row5
Enter number of terms/elements in row6
Enter element's column, and value of each term in row6
Enter number of terms/elements in row7
Enter element's column, and value of each term in row7
Enter number of terms/elements in row8
Enter element's column, and value of each term in row8
Enter number of terms/elements in row9
Enter element's column, and value of each term in row9
Matrix B, result:
rows = 10 columns = 10
row 1[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 2[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 3[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 4[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 5[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 6[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 7[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 8[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 9[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 val
row 10[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value = 0 ,col:8 va
Matrix C, result:
rows = 10 columns = 10
row 1[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 2[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 3[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 4[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 5[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 6[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 7[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 8[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 9[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
row 10[col:1 value = 111 ,col:5 value = 555 ,col:10 value = 53445]
```

- Triangle

- Input

input.txt | inputTri.txt | inputBig.txt

```
10 10
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 53445

10 10
10
1 1 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0
10
1 1 2 1 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0
10
1 1 2 1 3 1 4 0 5 0 6 0 7 0 8 0 9 0 10 0
10
1 1 2 1 3 1 4 1 5 0 6 0 7 0 8 0 9 0 10 0
10
1 1 2 1 3 1 4 1 5 1 6 0 7 0 8 0 9 0 10 0
10
1 1 2 1 3 1 4 1 5 1 6 1 7 0 8 0 9 0 10 0
10
1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 0 9 0 10 0
10
1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 0 10 0
10
1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 1 10 0
10
1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 1 10 1
```

- Output

```
Enter number of terms/elements in row5
Enter element's column, and value of each term in row5
Enter number of terms/elements in row6
Enter element's column, and value of each term in row6
Enter number of terms/elements in row7
Enter element's column, and value of each term in row7
Enter number of terms/elements in row8
Enter element's column, and value of each term in row8
Enter number of terms/elements in row9
Enter element's column, and value of each term in row9
Matrix A, result:
rows = 10 columns = 10
row 1[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 2[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 3[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 4[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 5[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 6[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 7[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 8[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 9[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 10[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
Reading Matrix B
Enter number of rows, columns
Enter number of terms/elements in row0
Enter element's column, and value of each term in row0
Enter number of terms/elements in row1
Enter element's column, and value of each term in row1
Enter number of terms/elements in row2
Enter element's column, and value of each term in row2
Enter number of terms/elements in row3
Enter element's column, and value of each term in row3
Enter number of terms/elements in row4
Enter element's column, and value of each term in row4
Enter number of terms/elements in row5
Enter element's column, and value of each term in row5
Enter number of terms/elements in row6
Enter element's column, and value of each term in row6
Enter number of terms/elements in row7
Enter element's column, and value of each term in row7
Enter number of terms/elements in row8
Enter element's column, and value of each term in row8
Enter number of terms/elements in row9
Enter element's column, and value of each term in row9
Matrix B, result:
rows = 10 columns = 10
row 1[col:1 value = 1 ,col:2 value = 0 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 0 ,col:6 value = 0 ,col:7 value
row 2[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 0 ,col:4 value = 0 ,col:5 value = 0 ,col:6 value = 0 ,col:7 value
row 3[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 0 ,col:5 value = 0 ,col:6 value = 0 ,col:7 value
row 4[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 0 ,col:6 value = 0 ,col:7 value
row 5[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 0 ,col:7 value
row 6[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 1 ,col:7 value
row 7[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 1 ,col:7 value
row 8[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 1 ,col:7 value
row 9[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 1 ,col:7 value
row 10[col:1 value = 1 ,col:2 value = 1 ,col:3 value = 1 ,col:4 value = 1 ,col:5 value = 1 ,col:6 value = 1 ,col:7 valu
Matrix C, result:
rows = 10 columns = 10
row 1[col:1 value = 111]
row 2[col:1 value = 111 ,col:2 value = 222]
row 3[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333]
row 4[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444]
row 5[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555]
row 6[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666]
row 7[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 8[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 9[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
row 10[col:1 value = 111 ,col:2 value = 222 ,col:3 value = 333 ,col:4 value = 444 ,col:5 value = 555 ,col:6 value = 666
 hmiles23@HAM  ~/Google Drive/Programming/C++/COP3530 - Data Structs/PA2/AssignmentII/AssignmentII  master ●
```