Hugh A. Miles II

09/21/16

COP3530

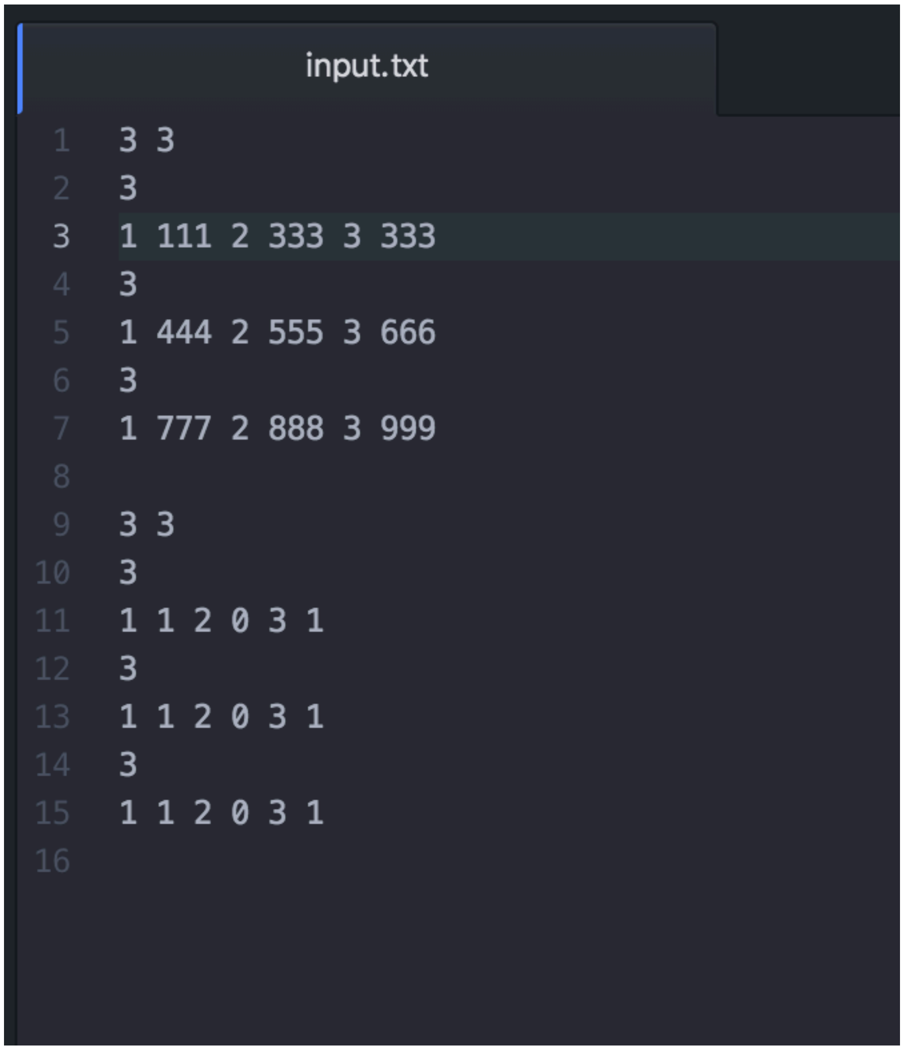
Sparse Matrix

- 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)

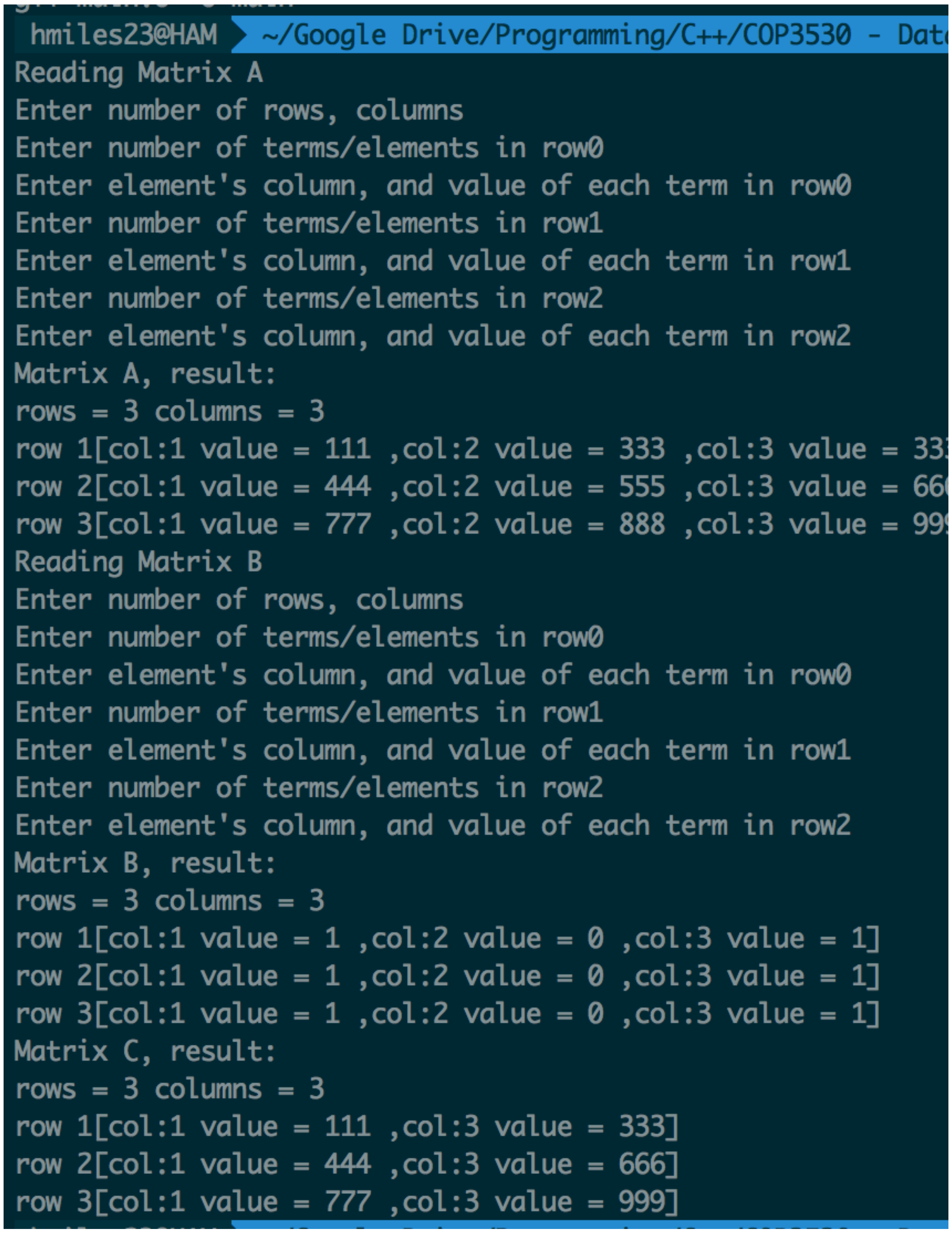
- Adds node with the value to the end of the list

- Test Cases
  - Small
    - Input



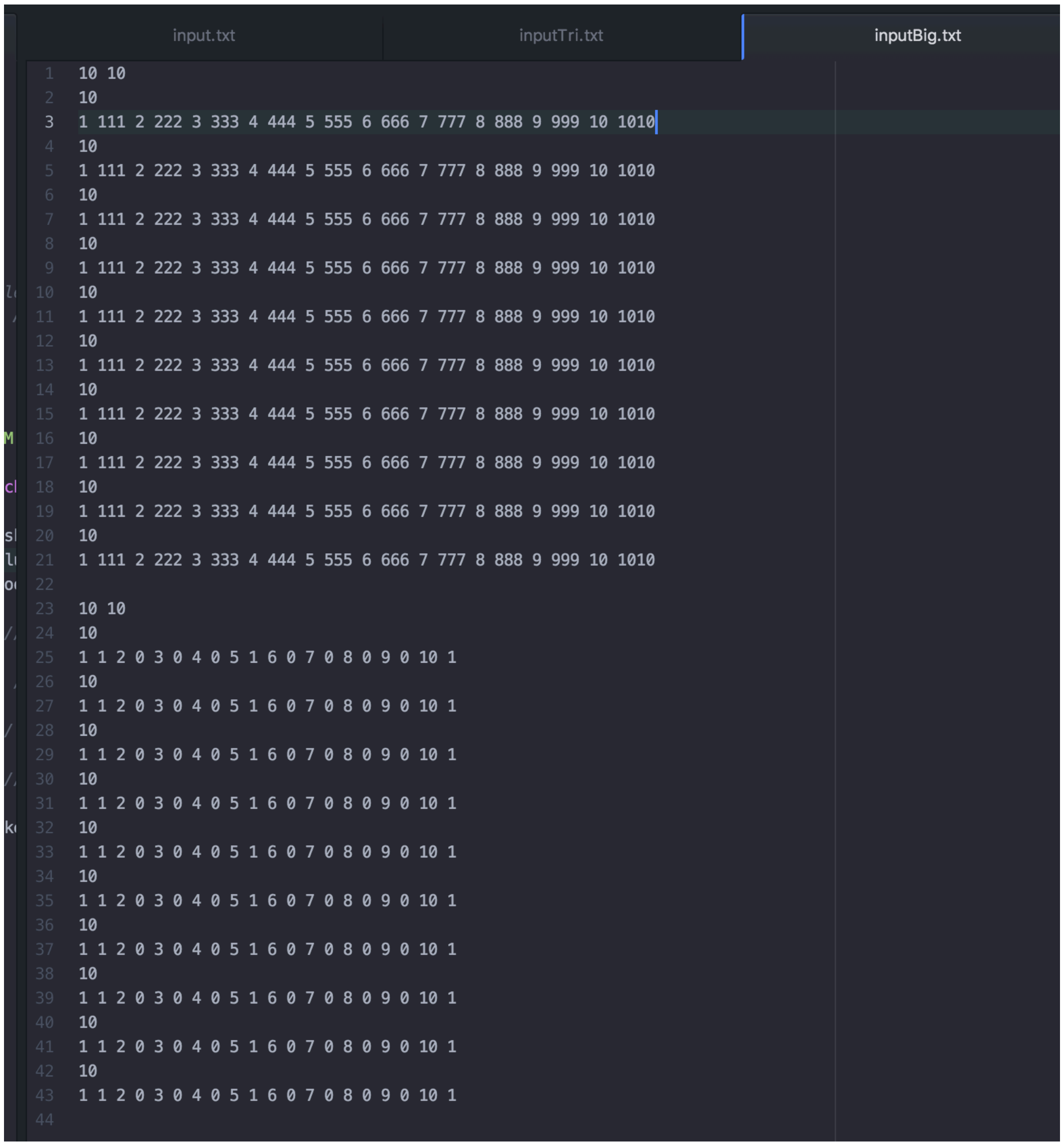
```
3 3
3
1 111 2 333 3 333
3
1 444 2 555 3 666
3
1 777 2 888 3 999

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

```

- Output



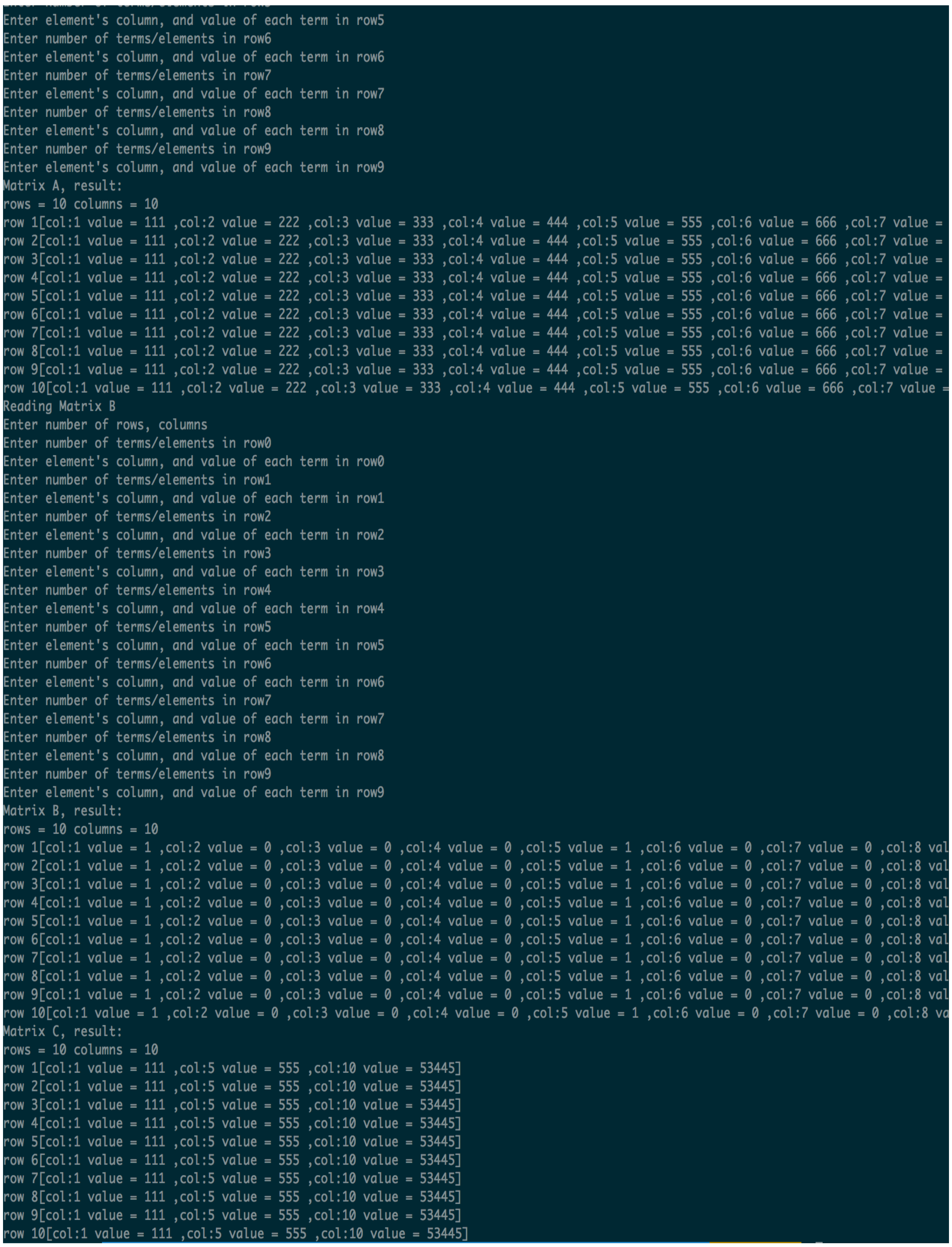
```
 hmiles23@HAM  ~/Google Drive/Programming/C++/COP3530 - Dat
Reading Matrix A
Enter number of rows, columns
Enter number of terms/elements in row0
Enter element's column, and value of each term in row0
Enter number of terms/elements in row1
Enter element's column, and value of each term in row1
Enter 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



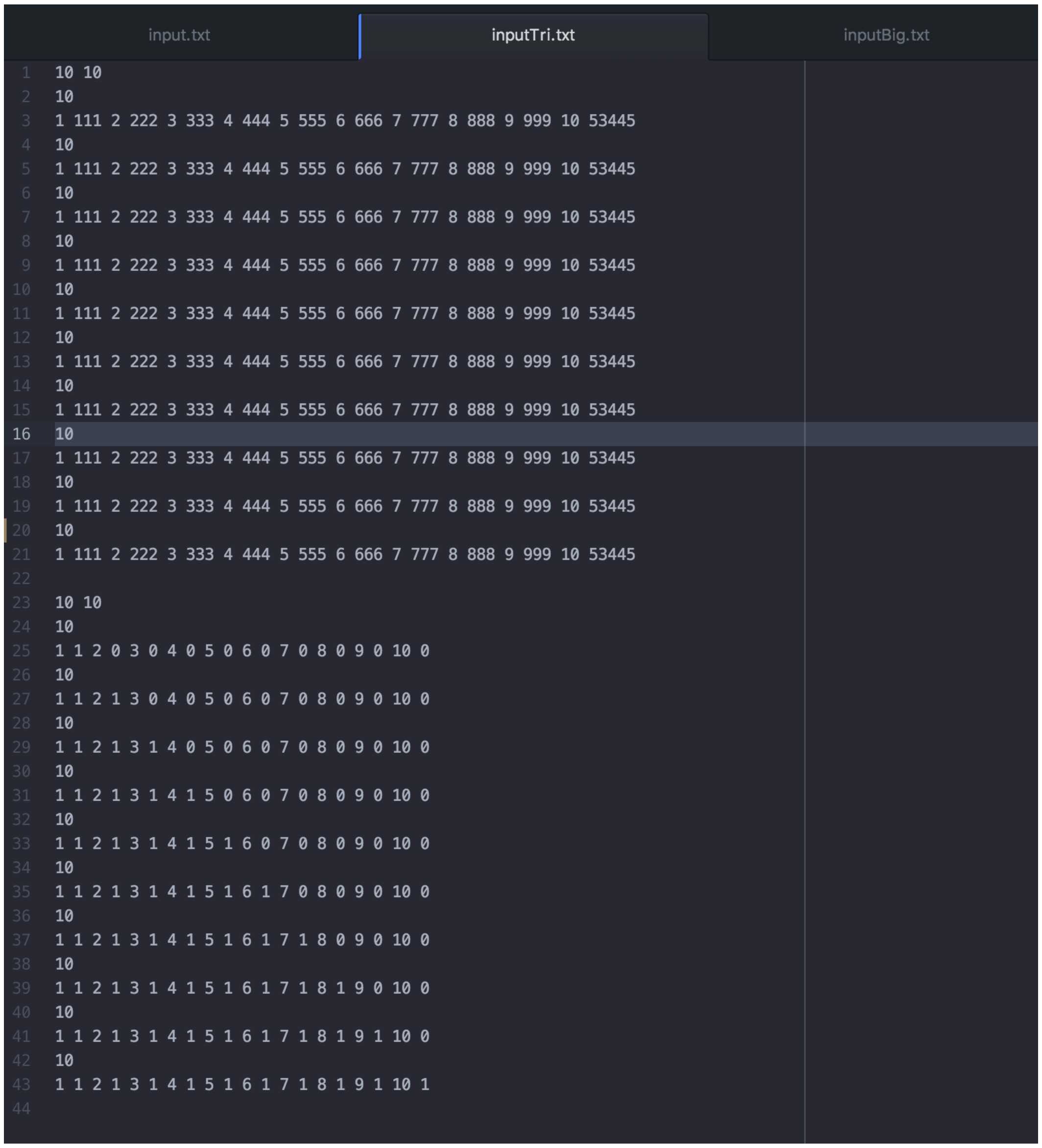
```
10 10
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555 6 666 7 777 8 888 9 999 10 1010
10
1 111 2 222 3 333 4 444 5 555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



```
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
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10
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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
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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

```
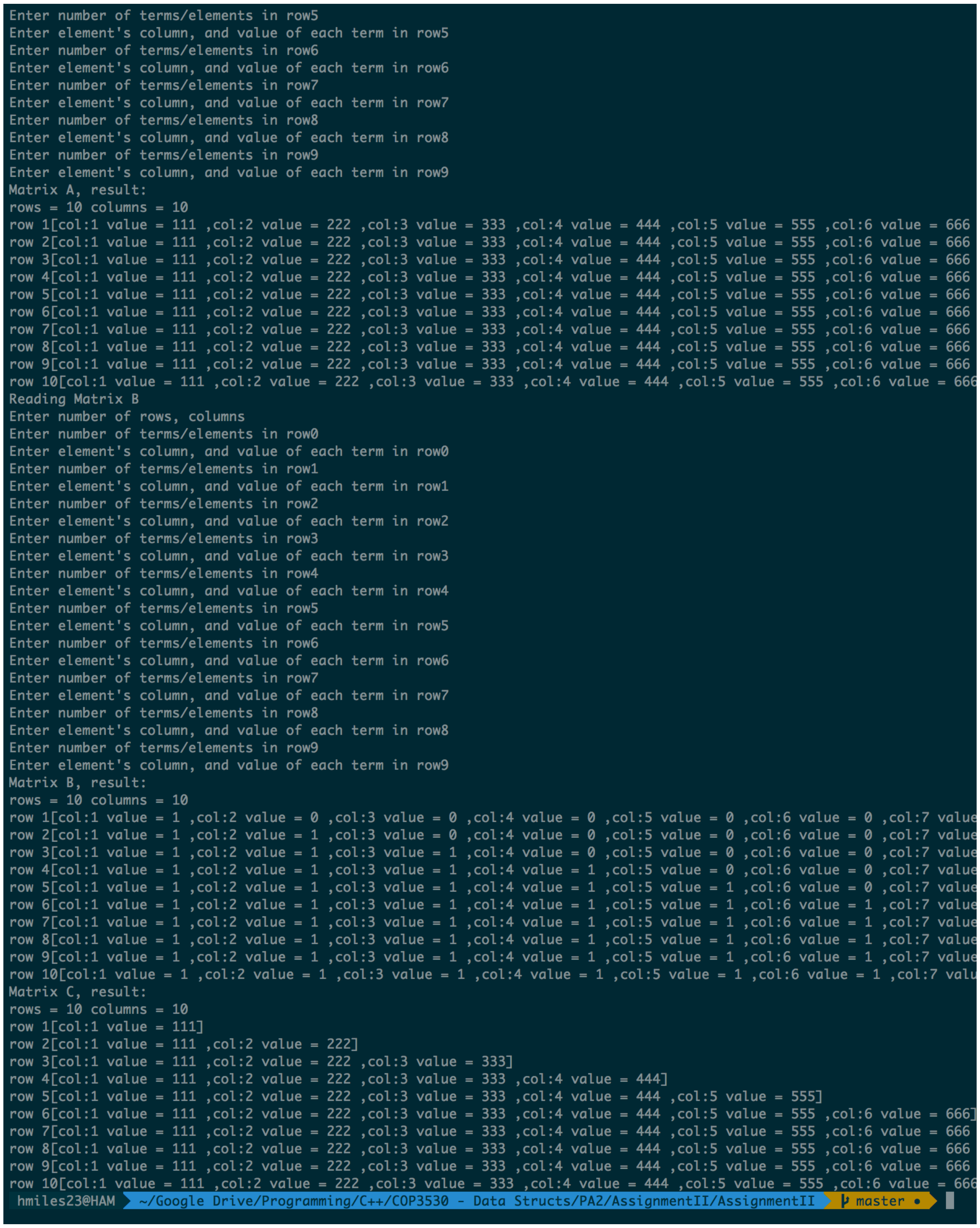

- Output



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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
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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
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Enter number of rows, columns
Enter number of terms/elements in row0
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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 ●
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