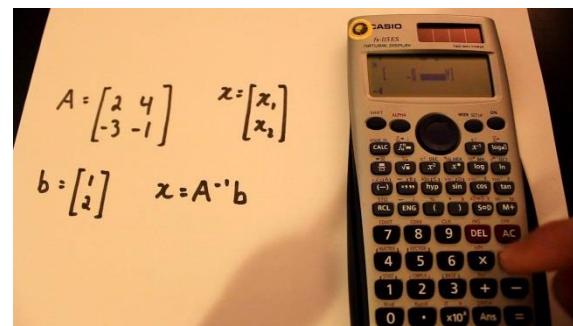
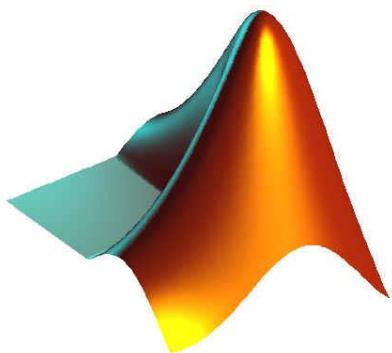


Mini Matlab





Background

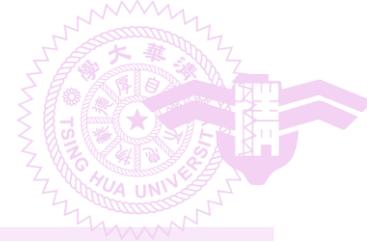
- Sparse matrix
 - Many zero terms in a matrix
 - Store row, col, and value to save memory space

An sparse matrix object

	3	4	5
	Row	Col	Value
a[0]	0	0	3
a[1]	0	2	1
a[2]	1	0	1
a[3]	1	1	3
a[4]	2	0	-1

Dim: 3×4 ,
with 5 nonzero terms

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



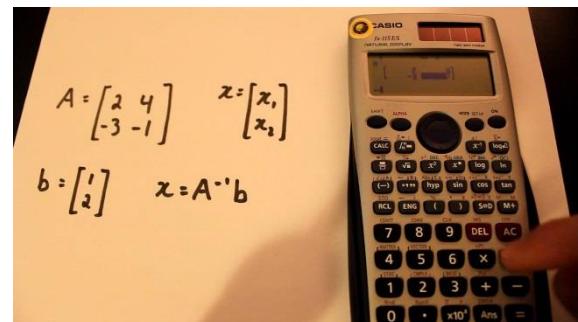
Our Mini Matlab

- Sparse matrix calculator
 - Given some matrices and their data
 - Given some arithmetic expressions in the infix notation
 - Postfix notation conversion
 - Expression evaluation

$$(A' + B) * C - D$$

→ $A'B + C * D -$

→ Output the results





Input information

- Operands
 - Naming: A~Z
 - Amount: 26 at most
 - Dimension at most 100 * 100
- Operators
 - * multiplication
 - + addition
 - - subtraction
 - ' (apostrophe) transpose
- Delimiters
 - (,) Parentheses
- Example
 - $(A'+B)*C-D$

Input Output Format

Note: this is just a format illustration, not a real example



Number of declared matrices
>=0

Matrix name

Dimensions (row and col) and the number of nonzero terms

Matrix name

Number of expressions
>>0

Expressions to evaluate

Input

2
A
15 30 4
1 1 -2
2 30 6
4 5 -9
14 1 10
B
15 30 4
2 6 5
10 5 6
11 5 -1
12 20 7
3
B'*A
(A+B)*A'
A'*(A-B)*(B+A)'

Output

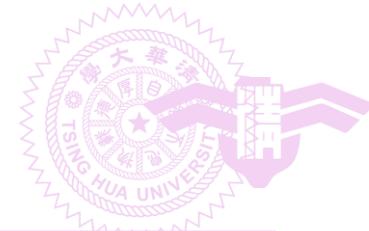
B'A*
30 30 4
3 18 -20
3 19 16
14 5 1
15 5 2
AB+A'*
15 15 3
2 3 9
18 60 -7
19 10 2
A'AB-*BA+'*
30 15 3
6 0 -2
6 5 8
7 8 10

Postfix notation (no space)

Dimensions (row and col) and the number of nonzero terms

single space

Last line has a newline character



Suggested Design Flow

Infix to postfix
conversion

Corresponding test cases are available on the NTHU Online Judge. **Partial credits** can be obtained.

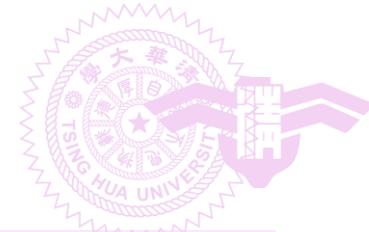
Sparse matrixes
Operations

Expression
evaluation



Some Tips

- Apostrophe character, "", is denoted as '\'' in C and C++
- It would be better to redirect standard I/O to file I/O during development and testing
 - Manually handling matrixes is slow and error-prone
- Resulting zero terms, e.g., [1, 50, 0], should be **removed** for keeping sparsity
- Test data will be available for testing
- For simplicity, it is allowed to create a 100-entry **array of matrices** for evaluating expressions
 - 26 arrays for operands A~Z
 - Other 74 for temporal matrices
 - Test cases have corresponding limited size



Other Information

- Mini Matlab uses three techniques that are taught by the textbook
- TA and the professor are glad to help everybody to finish this assignment !
- Please feel free to ask questions
- Online infix-to-postfix converter
 - http://scriptasylum.com/tutorials/infix_postfix/infix_pos.html