

Project 1

Yong Hoon Do, Chanyang Yim, Dongwook Kim

January 27, 2017

1 Exercise 1

Exercise 1.1 Set up a system of linear equations based on this problem from the *Nine Chapters on the Mathematical Art*.

The text then shows three columns set up on a counting board (a tool for mathematical calculation) in the following manner:

The given augmented matrix is:

$$\begin{array}{ccc} 1 & 2 & 3 \\ 2 & 3 & 2 \\ 3 & 1 & 1 \\ 26 & 34 & 39 \end{array}$$

Solution:

Setting the system of linear equations:

$$\begin{array}{l} 3x_1 + 2x_2 + x_3 = 39 \\ 2x_1 + 3x_2 + x_3 = 34 \\ x_1 + 2x_2 + 3x_3 = 26 \end{array} \tag{1}$$

Exercise 1.2 Write the equations you found in Exercise 1.1 as an augmented matrix. How does your matrix compare with the numbers on the counting board?

Solution:

Setting the augmented matrix found in the **Exercise 1.1**:

$$\left| \begin{array}{ccc|c} 3 & 2 & 1 & 39 \\ 2 & 3 & 1 & 34 \\ 1 & 2 & 3 & 26 \end{array} \right|$$

The major difference between the matrices is the order how the numbers are listed. According to the book *Nine Chapters on the Mathematical Art*, they vertically listed up the variables and created a matrix in this same fashion. The way how separating the coefficient variables is also following their writing order; from right to left and top to bottom. As this way of writing order developed during Han Dynasty, creating matrix also followed the same method that they used for writing Chinese letters.

Exercise 1.3 Use row operations to get your augmented matrix from Exercise 1.2 into row-echelon form and solve the system of equations.