Q1:

使用 Gaussian elimination 和 pivoting method 求解，過程及結果如下圖輸出

```
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> g++ .\6_1.cpp -o 6-1
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> ./6-1
   15.3000     0.1100   -13.1000    -1.0000     4.1600
    0.0000    -0.2141    24.3582    -0.0719    -0.4209
    0.0000   100.0000   -99.9000     1.0000     2.1500
    0.0000     2.1014   -98.9811     1.0778     0.7964
-----------------------------------------------------
   15.3000     0.1100   -13.1000    -1.0000     4.1600
    0.0000   100.0000   -99.9000     1.0000     2.1500
    0.0000     0.0000    24.1443    -0.0698    -0.4163
    0.0000     0.0000   -96.8818     1.0568     0.7513
-----------------------------------------------------
   15.3000     0.1100   -13.1000    -1.0000     4.1600
    0.0000   100.0000   -99.9000     1.0000     2.1500
    0.0000     0.0000   -96.8818     1.0568     0.7513
    0.0000     0.0000     0.0000     0.1936    -0.2291
-----------------------------------------------------
result:
x1 = 0.176776
x2 = 0.0126921
x3 = -0.0206612
x4 = -1.18326
```

Q2:

逆矩陣算法:

[A|I]經過 Gaussian elimination 變成[I|A^{-1}]

```
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> g++ .\6_2.cpp -o 6-2
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> ./6-2
A's inverse matrix:
    0.2797    -0.0805     0.0383    -0.0153
   -0.0805     0.3793     0.0575    -0.0230
    0.0383     0.0575     0.2107    -0.0843
   -0.0153    -0.0230    -0.0843     0.2337
```

Q3:

將矩陣拆成 LU 的形式

$$L \cdot U = \begin{bmatrix} l_0 & 0 & 0 & 0 \\ a_1 & l_1 & 0 & 0 \\ 0 & a_2 & l_2 & 0 \\ 0 & 0 & a_3 & l_3 \end{bmatrix} \cdot \begin{bmatrix} 1 & u_0 & 0 & 0 \\ 0 & 1 & u_1 & 0 \\ 0 & 0 & 1 & u_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

先解 Ly = d ，求出 y 後，再用 Ux = y 解出 x

```
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> g++ .\6_3.cpp -o 6-3
PS C:\Users\yunyu\Documents\大學\三下\數值方法\Numerical_class\F74114095_numerical_hw6> ./6-3
result:
x1 = 1.43636
x2 = 2.30909
x3 = 2.49091
x4 = 1.16364
```