Q1

Matrix

$$\begin{vmatrix} 2 & 2 \\ 4 & 2 \\ 3 & 97 \end{vmatrix}$$

Homogeneous

$$\begin{vmatrix} 2 & 2 & 1 \\ 4 & 2 & 1 \\ 3 & 97 & 1 \end{vmatrix}$$

$$\text{result} = \begin{vmatrix} 2 & 2 & 1 \\ 4 & 2 & 1 \\ 3 & 97 & 1 \end{vmatrix} X \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -2 & -2 & 1 \end{vmatrix} X \begin{vmatrix} 2 & 0 & 0 \\ 0 & 0.5 & 0 \\ 0 & 0 & 1 \end{vmatrix} X \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 2 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & 0 & 1 \\ 2 & 0 & 1 \\ 1 & 95 & 1 \end{vmatrix} X \begin{vmatrix} 2 & 0 & 0 \\ 0 & 0.5 & 0 \\ 0 & 0 & 1 \end{vmatrix} X \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 2 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & 0 & 1 \\ 4 & 0 & 1 \\ 2 & 47.5 & 1 \end{vmatrix} X \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 2 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} 2 & 2 & 1 \\ 6 & 2 & 1 \\ 4 & 49.5 & 1 \end{vmatrix}$$

Q2. Original Matrix = M.

$$\text{result} = M \times \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -T_x & -T_y & 1 \end{vmatrix} \times \begin{vmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ 0 & 0 & 1 \end{vmatrix} \times \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ T_x & T_y & 1 \end{vmatrix}$$

$$= M \times \begin{vmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ -S_x T_x & -S_y T_y & 1 \end{vmatrix} \times \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ T_x & T_y & 1 \end{vmatrix}$$

$$= M \times \begin{vmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ T_x(1-S_x) & T_y(1-S_y) & 1 \end{vmatrix}$$

Q3

$S_x = 2 \quad S_y = 0.5 \quad T_x = 2 \quad T_y = 2$

$T_x(1-S_x) = 2 \times (1-2) = -2$

$T_y(1-S_y) = 2 \times (1-0.5) = 1$

$$\begin{vmatrix} 2 & 0 & 0 \\ 0 & 0.5 & 0 \\ -2 & 1 & 1 \end{vmatrix}$$

$$\text{result} = \begin{vmatrix} & & \\ & & \\ & & \end{vmatrix} \times \begin{vmatrix} 0 & 0.5 & 0 \\ & & \\ -2 & 1 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} 2 & 2 & 1 \\ 4 & 2 & 1 \\ 3 & 97 & 1 \end{vmatrix} \times \begin{vmatrix} 2 & 0 & 0 \\ 0 & 0.5 & 0 \\ -2 & 1 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} 2 & 2 & 1 \\ 6 & 2 & 1 \\ 4 & 49.5 & 1 \end{vmatrix}$$

Q4

$$\begin{vmatrix} 4 & 8 & 4 & 1 & 80 \\ 2 & 1 & -4 & 1 & 7 \\ 3 & -1 & 2 & 1 & 22 \end{vmatrix}$$

$$\Rightarrow R1 \div 4 = \left(\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 2 & 1 & -4 & 7 \\ 3 & -1 & 2 & 22 \end{array}\right)$$

$$\Rightarrow R2 + R1 \times (-2) = \left(\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & -3 & -6 & -33 \\ 3 & -1 & 2 & 22 \end{array}\right)$$

$$\Rightarrow R3 + R1 \times (-3) = \left(\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & -3 & -6 & -33 \\ 0 & -7 & -1 & -38 \end{array}\right)$$

$$\Rightarrow R2 \times \left(-\frac{1}{3}\right) = \left(\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & 1 & 2 & 11 \\ 0 & -7 & -1 & -38 \end{array}\right)$$

$$\Rightarrow R3 + 7 \times R2 = \left(\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & 1 & 2 & 11 \\ \end{array}\right.$$

$$\left|\begin{array}{ccc|c} 0 & 0 & 13 & 39 \end{array}\right|$$

$$\Rightarrow R_3 \div 13 \quad \left|\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & 1 & 2 & 11 \\ 0 & 0 & 1 & 3 \end{array}\right|$$

$$\Rightarrow R_2 + R_3 \times (-2) = \left|\begin{array}{ccc|c} 1 & 2 & 1 & 20 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right|$$

$$\Rightarrow R_1 + R_2 \times (-2) = \left|\begin{array}{ccc|c} 1 & 0 & 1 & 10 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right|$$

$$\Rightarrow R_1 - R_3 = \left|\begin{array}{ccc|c} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 3 \end{array}\right|$$

$x = 7$, $y = 5$, $z = 3$

Q5.

Variable = 97.

$y = a_0 + a_1 x + a_2 x^2$ $\quad n = 5$

$\Sigma y = a_0 \Sigma 1 + a_1 \Sigma x + a_2 \Sigma x^2$

$\Sigma xy = a_0 \Sigma x + a_1 \Sigma x^2 + a_2 \Sigma x^3$

$\Sigma x^2 y = a_0 \Sigma x^2 + a_1 \Sigma x^3 + a_2 \Sigma x^4$

x	y	x^2	xy	x^2y	x^3	x^4	n
-5	97	25	-485	2425	-125	625	1
-3	10	9	-30	90	-9	81	1
0	1	0	0	0	0	0	1
3	10	9	30	90	9	81	1
5	97	25	485	2425	125	625	1

Σ	0	215	68	0	5030	0	1412	5

$$\left|\begin{array}{cc:c} 5 & 0 & 68 \\ 0 & 68 & 0 \\ \hline 68 & 0 & 1412 \end{array}\right| \left|\begin{array}{c} 215 \\ \\ 0 \\ \\ 5030 \end{array}\right|$$