2. Let P_{2c} is the coordinate of points in camera coordinate system and P_{1c} . . . . . .

$\therefore P_{2c} = R P_{1c}$

Now, $p_2 = K P_{2c} \rightarrow p_2 = KRP_{1c}$

$p_1 = K P_{1c} \rightarrow P_{1c} = K^{-1} p_1$

$\Rightarrow \boxed{p_2 = \underbrace{KRK^{-1}}_{M} p_1}$

($\because K$ is full rank matrix)

$p_1 = \begin{bmatrix} u_1 \\ v_1 \\ \omega_1 \end{bmatrix} \Rightarrow x_1 = \frac{u_1}{\omega_1}$ and $y_1 = \frac{v_1}{\omega_1}$

$p_2 = \begin{bmatrix} u_2 \\ v_2 \\ \omega_2 \end{bmatrix} \Rightarrow x_2 = \frac{u_2}{\omega_2}$ and $y_2 = \frac{v_2}{\omega_2}$

Now, $x_2 = \dfrac{M_{11} x_1 + M_{12} y_1 + M_{13}}{M_{31} x_1 + M_{32} y_1 + M_{33}}$

$y_2 = \dfrac{M_{21} x_1 + M_{22} y_1 + M_{23}}{M_{31} x_1 + M_{32} y_1 + M_{33}}$

Now,

$$\begin{bmatrix} x_{1i} & y_{1i} & 1 & 0 & 0 & 0 & -x_{1i}x_{2i} & -y_{1i}x_{2i} & -x_{2i} \\ 0 & 0 & 0 & x_{1i} & y_{1i} & 1 & -x_{1i}y_{2i} & -y_{1i}y_{2i} & -y_{2i} \\ \vdots & & & & & & & & \vdots \end{bmatrix} \begin{bmatrix} M_{11} \\ M_{12} \\ M_{13} \\ M_{21} \\ M_{22} \\ M_{23} \\ M_{31} \\ M_{32} \\ M_{33} \end{bmatrix} = 0$$

$$A_{2N \times 9} \; m_{9 \times 1} = 0$$

this eqn $Am = 0$ will be solved by computing the SVD of A i.e $A = USV^T$ the vector m will be given by the singular vector in V, corresponding to the least singular value in S.

Now, we got M matrix. $= KRK^{-1}$

$\therefore \boxed{R = K^{-1} M K}$