Problem 4 c) Using the conclusions from (a) and (b) derive the fundamental matrix F of the camera pair (M, M') using $a_{11}, a_{12}, a_{13}, a_{21}, a_{22}, a_{23}, b_1, b_2$. Then use the fact that F is only defined up to a scale factor to construct a seven-parameter expression for F.

From part (a), we know that $\hat{M} = MH$, $\hat{M}' = M'H$.
Combined with part (b), we know that the fundamental matrix of the camera pair (M, M') is equal to that of $(\hat{M}, \hat{M}')$.

We can the fundametal matrix F as:

$$F = \begin{bmatrix} 0 & -1 & b_2 \\ 1 & 0 & -b_1 \\ -b_2 & b_1 & 0 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} -a_{21} & -a_{22} & -a_{23} + b_2 \\ a_{11} & a_{12} & a_{13} - b_1 \\ -b_2 a_{11} + b_1 a_{21} & -b_2 a_{12} + b_1 a_{22} & -b_2 a_{13} + b_1 a_{23} \end{bmatrix}$$

We can factor out a_{21} to convert the matrix F into 7 parameters from 8.

$$F = \begin{bmatrix} -1 & \frac{-a_{22}}{a_{21}} & \frac{-a_{23} + b_2}{a_{21}} \\ \frac{a_{11}}{a_{21}} & \frac{a_{12}}{a_{21}} & \frac{a_{13} - b_1}{a_{21}} \\ \frac{-b_2 a_{11}}{a_{21}} + b_1 & \frac{-b_2 a_{12} + b_1 a_{22}}{a_{21}} & \frac{-b_2 a_{13} + b_1 a_{23}}{a_{21}} \end{bmatrix}$$

Since F now has 7 parameters, it is properly derived.