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11/25/2021

Enshu 08

$F^T F W = F^T Y$

x	0	1	2	3	4
y	1	2	1	0	4

$$F = \begin{pmatrix} 0 & 1 \\ 1 & 1 \\ 2 & 1 \\ 3 & 1 \\ 4 & 1 \end{pmatrix}$$

$$F^T F = \begin{pmatrix} 0 & 1 & 2 & 3 & 4 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 1 & 1 \\ 2 & 1 \\ 3 & 1 \\ 4 & 1 \end{pmatrix} = \begin{pmatrix} 30 & 10 \\ 10 & 1 \end{pmatrix}$$

$$F^T Y = \begin{pmatrix} 0 & 1 & 2 & 3 & 4 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 1 \\ 0 \\ 4 \end{pmatrix} = \begin{pmatrix} 0+2+2+0+16 \\ 1+2+1+0+4 \end{pmatrix} = \begin{pmatrix} 20 \\ 8 \end{pmatrix}$$

$$F^T F W = F^T Y \Rightarrow \left(\begin{array}{cc|c} 30 & 10 & w_1 \\ 10 & 1 & w_2 \end{array}\right) = \begin{pmatrix} 20 \\ 8 \end{pmatrix}$$ (crossed out)

$$= \left(\begin{array}{cc|c} 30 & 10 & 20 \\ 10 & 5 & 8 \end{array}\right) = \left(\begin{array}{cc|c} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & -\frac{7}{3} & \frac{4}{3} \end{array}\right) = \left(\begin{array}{cc|c} 1 & 0 & \\ 0 & 1 & -\frac{4}{7} \end{array}\right)$$ (crossed out)

$$= \left(\begin{array}{cc|c} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & \frac{145}{3} & \frac{422}{3} \end{array}\right) = \left(\begin{array}{cc|c} 1 & 0 & \frac{6}{15} \\ 0 & 1 & \frac{4}{5} \end{array}\right)$$

$$w_1 = \frac{2}{5}, \quad w_2 = \frac{4}{5}$$