a) $x^Tw = [1\ b\ 3]\begin{bmatrix} c \\ 4 \\ d \end{bmatrix} = c + 4b + 3d$

b) $w^Tx = [c\ 4\ d]\begin{bmatrix} 1 \\ b \\ 3 \end{bmatrix} = c + 4b + 3d$

a) $y = 2x^2 - 4x + 2$

$$x = \begin{bmatrix} x^2 \\ x \\ 1 \end{bmatrix}, \quad w = \begin{bmatrix} 2 \\ -4 \\ 2 \end{bmatrix}.$$

$$y = x^Tw = [x^2\ x\ 1]\begin{bmatrix} 2 \\ -4 \\ 2 \end{bmatrix}.$$

b) Similar as a), we get.

$$X = \begin{bmatrix} x_1^2 & x_1 & 1 \\ x_2^2 & x_2 & 1 \\ x_3^2 & x_3 & 1 \\ x_4^2 & x_4 & 1 \\ x_5^2 & x_5 & 1 \end{bmatrix}, \quad w = \begin{bmatrix} 2 \\ -4 \\ 2 \end{bmatrix}.$$

$$y = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{bmatrix} = Xw = \begin{bmatrix} x_1^2 & x_1 & 1 \\ x_2^2 & x_2 & 1 \\ x_3^2 & x_3 & 1 \\ x_4^2 & x_4 & 1 \\ x_5^2 & x_5 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 \\ -4 \\ 2 \end{bmatrix}.$$

3. a) $w = \begin{bmatrix} 9 \\ 4 \\ 4 \end{bmatrix}$

b) $X = \begin{bmatrix} 1 & 8 & 44 \\ 0.5 & 2 & 25 \\ 1.3 & 2.7 & 29.7 \\ 9 & 4 & 16 \end{bmatrix} \quad w = \begin{bmatrix} 9 \\ 4 \\ 4 \end{bmatrix}.$

$$y = Xw = \begin{bmatrix} 1 & 8 & 44 \\ 0.5 & 2 & 25 \\ 1.3 & 2.7 & 29.7 \\ 9 & 4 & 16 \end{bmatrix}\begin{bmatrix} 9 \\ 4 \\ 4 \end{bmatrix}.$$