TUTORIAL 08 (ADDITIONAL POINS) SOLUTION

f) $\underline{d} = \begin{bmatrix} -1 \\ 0 \end{bmatrix} \cdot \Delta$

$\underline{d}_1 = \begin{bmatrix} -1 \\ 0 \end{bmatrix} \Rightarrow \Omega_2$ ↯

$\underline{d}_2 = \begin{bmatrix} -3 \\ 0 \end{bmatrix} \Rightarrow \Omega_2$ ↯

$\underline{d}_3 = \begin{bmatrix} -2 \\ 0 \end{bmatrix} \Rightarrow \Omega_2$ ✓

$\underline{d}_4 = \begin{bmatrix} -4 \\ 0 \end{bmatrix} \Rightarrow \Omega_2$ ✓

- All assigned to Ω_2
- only 2 out of 4 correct

g) $d_1 = d_2 \Rightarrow -1 \cdot y_1 = 0$

$\Rightarrow y_1 = 0$

h) $\underline{d} = \begin{bmatrix} 0 & 3.5 \\ 1 & 0 \end{bmatrix} \cdot \underline{\underline{A}}^*$

$\underline{d_1} = \begin{bmatrix} 0 & 3.5 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 3.5 \\ 1 \end{bmatrix} \Rightarrow \Omega_1$ ✓

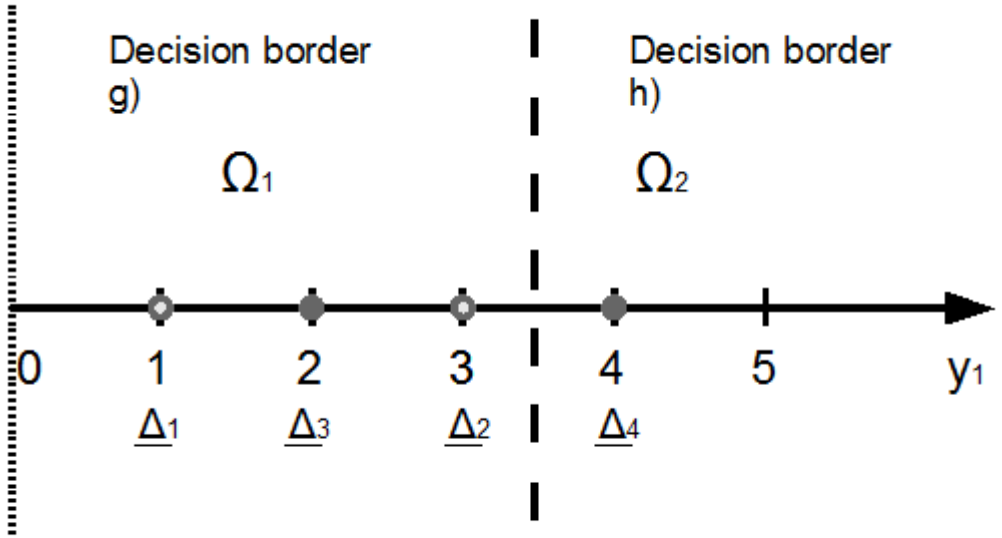
$\underline{d_2} = \begin{bmatrix} 0 & 3.5 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 3.5 \\ 3 \end{bmatrix} \Rightarrow \Omega_1$ ✓

$\underline{d_3} = \begin{bmatrix} 0 & 3.5 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 3.5 \\ 2 \end{bmatrix} \Rightarrow \Omega_1$ ↯

$\underline{d_4} = \begin{bmatrix} 0 & 3.5 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 \\ 1 \end{bmatrix} = \begin{bmatrix} 3.5 \\ 4 \end{bmatrix} \Rightarrow \Omega_2$ ✓

3 out of 4 correct classified

i) $d_1 = d_2$ $\quad 3.5 = y_1$



j)

$$\underline{d} = \begin{bmatrix} -1.33 & 0 & 0 & 1.5 \\ 0 & -10 & 22.67 & 0 \end{bmatrix} \begin{bmatrix} y_1^3 \\ y_1^2 \\ y_1 \\ 1 \end{bmatrix}$$

$$\underline{d}_1 = \underset{\sim}{W} \cdot \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 13.67 \\ 12.67 \end{bmatrix} \Rightarrow \Omega_1 \checkmark$$

$$\underline{d}_2 = \underset{\sim}{W} \begin{bmatrix} 27 \\ 9 \\ 3 \\ 1 \end{bmatrix} = \begin{bmatrix} -20.91 \\ -21.99 \end{bmatrix} \Rightarrow \Omega_1 \checkmark$$

$$\underline{d}_3 = \underset{\sim}{W} \begin{bmatrix} 8 \\ 4 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 4.36 \\ 5.34 \end{bmatrix} \Rightarrow \Omega_2 \checkmark$$

$$\underline{d}_4 = \underset{\sim}{W} \begin{bmatrix} 64 \\ 16 \\ 4 \\ 1 \end{bmatrix} = \begin{bmatrix} -70.12 \\ -69.32 \end{bmatrix} \Rightarrow \Omega_2 \checkmark$$

k) $d_1 = d_2$

$$-1.33\, y_1^3 + 15 = -10\, y_1^2 + 22.67\, y_1$$

$$\Rightarrow \quad -1.33\, y_1^3 + 10\, y_1 - 22.67\, y_1 + 15 = 0$$