HW-9

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Problem 1. *Beginning with* $(\mathbf{x}, \mathbf{w}, \mathbf{y}, \mathbf{z}) = (\mathbf{e}, \mathbf{e}, \mathbf{e}, \mathbf{e})$ *and using* $\delta = \frac{1}{10}$ *and* $r = \frac{9}{10}$ *compute* $(\bar{\mathbf{x}}, \bar{\mathbf{w}}, \bar{\mathbf{y}}, \bar{\mathbf{z}})$ *after one step of the path following method for each of the following problems.*

(1) *Exercise* 2.3

(2) *Exercise* 2.4

(3) *Exercise* 2.5

(4) *Exercise* 2.10

Proof. With $(\mathbf{x}, \mathbf{w}, \mathbf{y}, \mathbf{z}) = (\mathbf{e}, \mathbf{e}, \mathbf{e}, \mathbf{e}), X = W = Y = Z = I$. Thus $\Delta(\mathbf{x}, \mathbf{w}, \mathbf{y}, \mathbf{z}) =$

$$\begin{bmatrix} -A & I & O & O \\ O & O & A^T & I \\ I & O & O & I \\ O & I & I & O \end{bmatrix}^{-1} \begin{bmatrix} \mathbf{b} - A\mathbf{e} - \mathbf{e} \\ \mathbf{c} - A^T\mathbf{e} + \mathbf{e} \\ \frac{11}{10}\mathbf{e} \\ \frac{11}{10}\mathbf{e} \end{bmatrix} = \begin{bmatrix} -A^{-1} & X & O & A^{-1} \end{bmatrix} \begin{bmatrix} -A & I & O & O \\ O & O & A^T & I \\ I & O & O & I \\ O & I & I & O \end{bmatrix}$$

$\square$

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