# Nise 7.2

$$s^5 + 6s^3 + 5s^2 + 8s + 20$$

| | | | | $\epsilon+$ | $\epsilon-$ |
|---|---|---|---|---|---|
| $s^5$ | 1 | 6 | 8 | + | + |
| $s^4$ | ~~0~~ $\epsilon$ | ~~8~~ 1 | ~~2~~0 4 | + | − |
| $s^3$ | $\dfrac{6\epsilon-1}{\epsilon}$ | $\dfrac{8\epsilon-4}{\epsilon}$ | 0 | − | + |
| $s^2$ | $\dfrac{8\epsilon^2-10\epsilon+1}{1-6\epsilon}$ | 4 | 0 | + | + |
| $s^1$ | $d_1$ | 0 | | + | + |
| $s^0$ | 4 | | | + | + |

$$-\frac{1}{\epsilon}\begin{vmatrix} 1 & 6 \\ \epsilon & 1 \end{vmatrix} = -\frac{1}{\epsilon}(1-6\epsilon)$$

$$= \frac{6\epsilon-1}{\epsilon}$$

$$-\frac{1}{\epsilon}\begin{vmatrix} 1 & 8 \\ \epsilon & 4 \end{vmatrix} = \frac{4-8\epsilon}{-\epsilon}$$

$$= \frac{8\epsilon-4}{\epsilon}$$

$$-\frac{\epsilon}{6\epsilon-1}\begin{vmatrix} \epsilon & 1 \\ \dfrac{6\epsilon-1}{\epsilon} & \dfrac{8\epsilon-4}{\epsilon} \end{vmatrix}$$

$$= \frac{-\epsilon}{6\epsilon-1}\left(8\epsilon-4 - \frac{6\epsilon-1}{\epsilon}\right)$$

$$= \frac{-\epsilon}{6\epsilon-1}\left(\frac{8\epsilon^2}{\epsilon} - \frac{4\epsilon}{\epsilon} - \frac{6\epsilon-1}{\epsilon}\right)$$

$$= \frac{-\epsilon}{6\epsilon-1}\left(\frac{8\epsilon^2-10\epsilon+1}{\epsilon}\right)$$

$$= \frac{8\epsilon^2-10\epsilon+1}{1-6\epsilon}$$

$$\frac{-1}{d_1}\begin{vmatrix} c_1 & 4 \\ d_1 & 0 \end{vmatrix} = \frac{-1}{d_1}(-4d_1) = 4$$

**roots:**

6.6 ± 1.3j

0 ± 2j

−1.3

$$-\frac{\epsilon}{6\epsilon-1}\begin{vmatrix} \epsilon & 4 \\ \dfrac{6\epsilon-1}{\epsilon} & 0 \end{vmatrix}$$

$$= \frac{-\epsilon}{6\epsilon-1}\left(-4\frac{6\epsilon-1}{\epsilon}\right) = 4$$

$$-\frac{1-6\epsilon}{8\epsilon^2-10\epsilon+1}\begin{vmatrix} \dfrac{6\epsilon-1}{\epsilon} & \dfrac{8\epsilon-4}{\epsilon} \\ \dfrac{8\epsilon^2-10\epsilon+1}{1-6\epsilon} & 4 \end{vmatrix}$$

$$= -\frac{1-6\epsilon}{8\epsilon^2-10\epsilon+1}\left(4\frac{6\epsilon-1}{\epsilon} - \frac{8\epsilon-4}{\epsilon}\cdot\frac{8\epsilon^2-10\epsilon+1}{1-6\epsilon}\right)$$

$$= -\frac{1-6\epsilon}{8\epsilon^2-10\epsilon+1}\left(-\frac{8\epsilon-4}{\epsilon}\cdot\frac{8\epsilon^2-10\epsilon+1}{1-6\epsilon}\right) - \frac{1-6\epsilon}{8\epsilon^2-10\epsilon+1}\left(4\frac{6\epsilon-1}{\epsilon}\right)$$

$$= \frac{8\epsilon-4}{\epsilon} + 4\frac{(6\epsilon-1)^2}{8\epsilon^3-10\epsilon^2+\epsilon} = \frac{(8\epsilon-4)(8\epsilon^2-10\epsilon+1)+4(6\epsilon-1)^2}{8\epsilon^3-10\epsilon^2+\epsilon}$$

$$= d_1 = \frac{64\epsilon^3-80\epsilon^2+8\epsilon-32\epsilon^2+40\epsilon-4+4(36\epsilon^2-12\epsilon+1)}{8\epsilon^3-10\epsilon^2+\epsilon}$$

$$= \frac{64\epsilon^3+32\epsilon^2}{8\epsilon^3-10\epsilon^2+\epsilon} = \frac{64\epsilon^2+32\epsilon}{8\epsilon^2-10\epsilon+1}$$