Q4.1 ed.6 (Q4.2 ed.5)

Third order: 0.499965 ($\varepsilon_s = 0.5 \times 10^{2-2}\% = 0.5\%$)

Q 4.5 ed.6 (Q 4.4 ed.5)

Zero order: $\varepsilon_t = 111.191\%$

First order: $\varepsilon_t = 85.921\%$

Second order: $\varepsilon_t = 36.101\%$

Third order: $\varepsilon_t = 0\%$

Q 4.4 ed.6 (Q 4.5 ed.5)

Zero order: $\varepsilon_t = 100\%$

First order: $\varepsilon_t = 63.704\%$

Second order: $\varepsilon_t = 59.074\%$

Third order: $\varepsilon_t = 63.704\%$

Fourth order: $\varepsilon_t = 74.421\%$

Q 5.3

(b) x_r=0.59375

(c) x_r=0.57956

Q 5.5

x_r =0.921875

error check 0.0132774

Q 5.17 ed.6 (Q 5.16 ed.5)

h = 2.02390

Q. 6.30 ed.6 (Q6.26 ed.5)

h = 2.026906

Q 6.7

(a)

i	x_i
0	**3**
1	**-0.02321**
2	**-1.22635**
3	**0.233951**
4	**0.396366**

(b)

i	x_i
0	**2.5**
1	**2.356929**
2	**2.547287**
3	**2.526339**
4	**2.532107**

(c) For initial guesses of $x_{i-1} = 1.5$ and $x_i = 2.25$, four iterations of the secant method yields

i	x_i
0	**2.25**
1	**1.927018**
2	**1.951479**
3	**1.944604**
4	**1.944608**

Q 9.3 ed.6 (Q 9.2 ed.5)

(a) $[A]$ = 3×2 $[B]$ = 3×3 $[C]$ = 3×1 $[D]$ = 2×4

$[E]$ = 3×3 $[F]$ = 2×3 $[G]$ = 1×3

(b) Square: $[B]$ and $[E]$

Column: $[C]$

Row: $[G]$

(c) $a_{12} = 7$ $b_{23} = 7$ d_{32} = does not exist

$e_{22} = 2$ $f_{12} = 0$ $g_{12} = 6$

(d) (1) $[E]+[B]=\begin{bmatrix} 5 & 8 & 15 \\ 8 & 4 & 10 \\ 6 & 0 & 10 \end{bmatrix}$ (2) $[A]+[F]=\text{not possible}$

(3) $[B]-[E]=\begin{bmatrix} 3 & -2 & -1 \\ -6 & 0 & 4 \\ -2 & 0 & -2 \end{bmatrix}$ (4) $7[B]=\begin{bmatrix} 28 & 21 & 49 \\ 7 & 14 & 49 \\ 14 & 0 & 28 \end{bmatrix}$

(5) $[E]\times[B]=\begin{bmatrix} 25 & 13 & 74 \\ 36 & 25 & 75 \\ 28 & 12 & 52 \end{bmatrix}$ (6) $\{C\}^T = \lfloor 3 \quad 6 \quad 1 \rfloor$

(7) $[B]\times[A]=\begin{bmatrix} 54 & 76 \\ 41 & 53 \\ 28 & 38 \end{bmatrix}$ (8) $\{D\}^T = \begin{bmatrix} 9 & 2 \\ 4 & -1 \\ 3 & 7 \\ -6 & 5 \end{bmatrix}$

(9) $[A]\times[C]=\text{not possible}$ (10) $[I]\times[B]=[B]$

(11) $[E]^T[E]=\begin{bmatrix} 66 & 19 & 53 \\ 19 & 29 & 46 \\ 53 & 46 & 109 \end{bmatrix}$ (12) $[C]^T[C]=46$

Q.9.7

(b) The determinant : $D = 0.5(-2)-(-1)1.02 = 0.02$

(c) The system is ill-conditioned.

(d) $x_1 = 10 \;\; x_2 = 14.5$

(e) $x_1 = -10 \;\; x_2 = 4.3$

The ill-conditioned nature of the system is illustrated by the fact that a small change in one of the coefficients results in a huge change in the results.

Q10.2

(a) $[L]=\begin{bmatrix}1 & 0 & 0\\ -0.3 & 1 & 0\\ 0.1 & -0.14815 & 1\end{bmatrix}$ $\quad [U]=\begin{bmatrix}10 & 2 & -1\\ 0 & -5.4 & 1.7\\ 0 & 0 & 5.351852\end{bmatrix}$

(b) $x_1 = 0.5\ x_2 = 8\ x_3 = -6$

(c) $x_1 = 1.972318\ x_2 = -4.23529\ x_3 = -0.7474$

Q10.6

$$[A]^{-1}=\begin{bmatrix}0.110727 & 0.038062 & 0.006920\\ -0.058824 & -0.176471 & 0.058824\\ -0.010381 & 0.027682 & 0.186851\end{bmatrix}$$

Q 10.15 ed.6 (Q 10.12 ed.5)

(a)The condition number : $\text{Cond}[A]=255(4.5274\times10^{15})=1.1545\times10^{18}$

This corresponds to $\log_{10}(1.1545 \times 10^{18})$ = 18.06 suspect digits.

Thus, the suspect digits are more than the number of significant digits for the double precision representation used in MATLAB (15-16 digits). Consequently, we can conclude that this matrix is highly ill-conditioned.

(b)The condition number can then be computed as

$$\text{Cond}[A]=3.1481(8.3596\times10^{16})=2.6317\times10^{17}$$

This corresponds to $\log_{10}(2.6317 \times 10^{17})$ = 17.42 suspect digits. Thus, as with **(a)**, the suspect digits are more than the number of significant digits for the double precision representation used in MATLAB (15-16 digits). Consequently, we again can conclude that this matrix is highly ill-conditioned.