H.W Quiz 4

Quiz #7 $x_1 = -\frac{2}{3}$ $x_2 = \frac{4}{9}$

Quiz #8 $A = \underbrace{\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}}_{L} \underbrace{\begin{bmatrix} 3 & 7 \\ 0 & -13 \end{bmatrix}}_{U}$ $Lc = \begin{bmatrix} 1 \\ -11 \end{bmatrix}$, $c = \begin{bmatrix} 1 \\ -13 \end{bmatrix}$

$Ux = c$, $x = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$

Quiz #9 1. $\begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix} \hat{x} = \begin{bmatrix} 6 \\ 4 \end{bmatrix}$ $\hat{x} = \frac{1}{4}\begin{bmatrix} 7 \\ 3 \end{bmatrix}$

2. $A[2,:] = A[2,:] - 4 * A[0,:]$

3. $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} A = \begin{bmatrix} 1 & & \\ 1/4 & 1 & \\ 1/2 & -1/2 & 1 \end{bmatrix} \begin{bmatrix} 4 & 4 & -4 \\ & 2 & 2 \\ & & 8 \end{bmatrix}$

Quiz #10 1. a) $A = \underbrace{\frac{1}{7}\begin{bmatrix} 6 & 2 \\ 3 & -6 \\ 2 & 3 \end{bmatrix}}_{Q} \underbrace{\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}}_{R}$

b) $A\hat{x} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \rightarrow R\hat{x} = Q^T \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \frac{1}{7}\begin{bmatrix} 6 \\ 2 \end{bmatrix}$, $\hat{x} = \frac{1}{49}\begin{bmatrix} 6 \\ 2 \end{bmatrix}$

2. $x_1 = \begin{bmatrix} 5/3 \\ 2 \end{bmatrix}$ $\hat{r} = b - Ax_1 = \begin{bmatrix} 2 \\ 1/3 \end{bmatrix}$ rel back $= \frac{\|\hat{r}\|_\infty}{\|b\|_\infty} = \frac{2}{5}$

Quiz #11: 1. $\frac{2}{3} 1000^3 + 500 \cdot 2 \cdot 1000^2$

2. a) $\begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}$ b) $\begin{bmatrix} -\frac{1}{2} \\ 1 \end{bmatrix}$

Quiz #12: $P = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ $L = \begin{bmatrix} 1 & \\ 2/3 & 1 \end{bmatrix}$ $U = \begin{bmatrix} 3 & 2 \\ & 5/3 \end{bmatrix}$

$Lc \overset{P}{=} b$, $c = \begin{bmatrix} -4 \\ 16/3 \end{bmatrix}$, $Ux = c$, $x = \begin{bmatrix} +1 \\ -2 \end{bmatrix}$

Quiz #13: $X_1 = \begin{bmatrix} .4 \\ 1.76 \end{bmatrix}$

Quiz #14: $\begin{array}{c|cc} 1 & 1 & \\ 3 & 2 & \geq \frac{1}{2} \end{array}$ $P_1(x) = 1 + \frac{1}{2}(x-1)$

Quiz #15: (a) Exact $= 8$, $(m=40)$ 8.0050, $(m=80)$ 8.0013

(b) $f''(x) = 12x$ has max 24 on $[0,2]$ so when $m=40$ $h = .05$ and $E \leq \frac{(2-0)\cdot .05^2}{12} \cdot 24 = 1/100$. This bound is verified because exact − approx $= -0.005$ when $m=40$

Quiz 16: 1. 0.6566 2. $\begin{bmatrix} 1.2739 \\ 0.6885 \\ 1.2124 \\ 1.7497 \end{bmatrix}$