Solutions to HW 1.

1. $Ax = \begin{pmatrix} 6 \\ 15 \end{pmatrix}$ $-5'$

$A^T y = \begin{pmatrix} 14 \\ 19 \\ 24 \end{pmatrix}$ $-5'$

$AB^T = \begin{pmatrix} -2 & 1 \\ -2 & 1 \end{pmatrix}$ $-10'$

2. ① $-5'$

② $-5'$

③ $-10'$

3. Pf: $\|x\| = \|x-y+y\| \le \|x-y\| + \|y\|$

$\Rightarrow \|x\| - \|y\| \le \|x-y\|$ ① $-10'$

$\|y\| = \|y-x+x\| \le \|y-x\| + \|x\|$

$= \|x-y\| + \|x\|$

$\Rightarrow \|y\| - \|x\| \le \|x-y\|$ ② $-10'$

$\Rightarrow \big|\|x\| - \|y\|\big| \le \|x-y\|$

#

4. `c(i) = c(i) + A(i,j) * b(j);` −10'

`c(i) = c(i) + A(i,j) * b(j);` −10'

wrong time with right coding, 5' was taken off.

5. $\begin{pmatrix} 2 & 1 & 1 & 2 \\ 4 & 5 & 3 & 2 \\ 2 & -2 & 3 & 7 \end{pmatrix} \to \begin{pmatrix} 2 & 1 & 1 & 2 \\ 0 & 3 & 1 & -2 \\ 0 & -3 & 2 & 5 \end{pmatrix} \to \begin{pmatrix} 2 & 1 & 1 & 2 \\ 0 & 3 & 1 & -2 \\ 0 & 0 & 3 & 3 \end{pmatrix}$ 6'

$\Rightarrow \begin{cases} 2x_1 + x_2 + x_3 = 2 \\ 3x_2 + x_3 = -2 \\ x_3 = 3 \end{cases} \Rightarrow \begin{cases} x_1 = 1 \\ x_2 = -1 \\ x_3 = 1 \end{cases}$ 6' 8'