# HW1 Feeback 211

## Section 1.1 →

Q1–3 well done – make sure that all steps are explained in your computations!

Q4)
$$\left[\begin{array}{l} x+y-z=-2 \\ 3x-5y+13z=18 \\ x-2y+5z=k \end{array}\right]\begin{array}{l} \\ -3\mathrm{I} \\ -\mathrm{I}\end{array} \rightarrow \left[\begin{array}{l} x+y-z=-2 \\ -8y+16z=24 \\ -3y+6z=k+2 \end{array}\right]\begin{array}{l} \\ \div -8 \\ \\ \end{array}$$

$$\rightarrow \left[\begin{array}{l} x+y+z=-2 \\ y-2z=-3 \\ -3y+6z=k+2 \end{array}\right]\begin{array}{l} -\mathrm{I} \\ \\ +3\mathrm{II}\end{array} \rightarrow \left[\begin{array}{l} x+z=1 \\ y-2z=-3 \\ 0=k-7 \end{array}\right]$$

a) The system does not have a unique solution (can never have $z=*$.).
When $k=7$ last equation is $0=0$. So $z$ is a free variable and there are $\infty$ solutions

b/c) When $k=7$
$$x=1-t$$
$$y=-3+2t$$
$$z=t$$

when $k\neq 7$ Then last equation reads $0=k-7\neq 0$
Thus the system is inconsistent $\Rightarrow$ no solutions.

Q5) Most people lost points for not considering the cases degree 0 $f(t)=c$ a constant $\Rightarrow f'(t)=0\neq 1=f'(1)$. $\Downarrow$ not possible.
degree 1 $f(t)=at+b$

Here $f'(t)=a$ $f'(1)=a$. Solve

$$\left[\begin{array}{l} a+b=3 \\ 2a+b=+6 \\ a=1 \end{array}\right]\begin{array}{l} \\ -2\mathrm{I} \\ -\mathrm{I}\end{array} \rightarrow \left[\begin{array}{l} a+b=3 \\ -b=0 \\ -b=-2 \end{array}\right] \rightarrow \left[\begin{array}{l} a+b=3 \\ b=0 \\ 0=2 \end{array}\right]$$

so no solution.

Section 1.2

1b) $$\left[\begin{array}{cc|c}1&1&1\\2&-1&5\\3&4&2\end{array}\right]\begin{array}{l}\\-2\mathrm{I}\\-3\mathrm{I}\end{array} \rightarrow \left[\begin{array}{cc|c}1&1&1\\0&-3&3\\0&1&-1\end{array}\right] \div -3 \rightarrow \left[\begin{array}{cc|c}1&1&1\\0&1&-1\\0&1&-1\end{array}\right]\begin{array}{l}-\mathrm{II}\\ \\-\mathrm{II}\end{array}$$

$$\rightarrow \left[\begin{array}{cc|c}1&0&2\\0&1&-1\\0&0&0\end{array}\right]$$

$x=2$

$y=2$

$\longrightarrow$ This equation gives no information.

1d) $$\left[\begin{array}{ccccc|c}0&1&0&2&3&0\\0&0&0&4&8&0\end{array}\right]\begin{array}{l}\\ \div 4\end{array} \quad \left[\begin{array}{ccccc|c}0&1&0&2&3&0\\0&0&0&1&2&0\end{array}\right]\begin{array}{l}-2\mathrm{II}\\ \\ \end{array} \quad \left[\begin{array}{ccccc|c}0&1&0&0&-1&0\\0&0&0&1&2&0\end{array}\right]$$

$x_1=t \qquad x_4=-2r$

$x_2=r \qquad x_5=r.$

$x_3=s$

3) $$\begin{bmatrix}1\\0\\0\\0\end{bmatrix} \begin{bmatrix}0\\0\\0\\0\end{bmatrix}$$

<u>Note</u> $\begin{bmatrix}0\\1\\0\\0\end{bmatrix}$ is not in rref, There is a leading 1 in the 2nd row, but not in the row above it, the first row.

4) $$\begin{bmatrix}0&0&0\\0&0&0\end{bmatrix} \begin{bmatrix}1&a&b\\0&0&0\end{bmatrix} \begin{bmatrix}0&1&a\\0&0&0\end{bmatrix} \begin{bmatrix}0&0&1\\0&0&0\end{bmatrix}$$

$$\begin{bmatrix}1&a&0\\0&0&1\end{bmatrix} \begin{bmatrix}1&0&b\\0&1&a\end{bmatrix} \begin{bmatrix}0&1&0\\0&0&1\end{bmatrix}$$ $a, b$ constants

5) Suppose $A \rightarrow B$ via elementary row operation.

a) Row $i$ swapped with row $j$. To go from $B \rightarrow A$, just swap them back.

b) $\overset{A \longrightarrow B}{\text{Row } i \rightarrow k\,\text{row } i}$. To go from $B \rightarrow A$ row $i \rightarrow \frac{1}{k}$ row $i$

c) $\overset{A \rightarrow B}{\text{row } i \rightarrow \text{row } i + k\,\text{row } j}$. To go from $B \rightarrow A$ row $i \rightarrow$ row $i - k$ row $j$

Note that in each case, it is an elementary row operation.