

Solutions for lecture 13

$$\begin{bmatrix} 3 & 2 \\ -1 & 0 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} 3-2 & 3+2 \\ -1+0 & -1+0 \\ 1-3 & 1+3 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 5 \\ -1 & -1 \\ -2 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 1 \\ 5 & -1 \end{bmatrix} \begin{bmatrix} P \\ Q \end{bmatrix} = \begin{bmatrix} 240 \\ 30 \end{bmatrix}$$

$$\left[\begin{array}{cc|c} 4 & 1 & 240 \\ 5 & -1 & 30 \end{array} \right]$$

$$R_2 \rightarrow R_2 + R_1$$

$$\textcircled{I} \left[\begin{array}{cc|c} 4 & 1 & 240 \\ 9 & 0 & 270 \end{array} \right]$$

$$\textcircled{II} \quad 9P = 270 \quad P = 30$$

$$\textcircled{+} 4P + Q = 240$$

$$120 + Q = 240$$

$$Q = 120$$

$$\begin{bmatrix} -2 & 3 & 1 \\ -1 & 2 & 0 \\ 0 & -1 & 6 \\ 1 & -1 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 5 \end{bmatrix}$$

$$\left[\begin{array}{ccc|c} -2 & 3 & \boxed{1} & 0 \\ -1 & 2 & 0 & 0 \\ 0 & -1 & 6 & 0 \\ 1 & -1 & 5 & 5 \end{array} \right]$$

$$R_3 \rightarrow R_3 - 6R_1$$

~~R_2~~

$$R_4 \rightarrow R_4 - 5R_1$$

$$\left[\begin{array}{ccc|c} -2 & 3 & 1 & 0 \\ \boxed{-1} & 2 & 0 & 0 \\ +1/2 & -19 & 0 & 0 \\ 11 & -16 & 0 & 5 \end{array} \right]$$

$$R_3 \rightarrow R_3 + 12R_2$$

$$R_4 \rightarrow R_4 + 11R_2$$

$$\begin{bmatrix} -2 & 3 & 1 & | & 6 \\ -1 & 2 & 0 & | & 0 \\ 0 & 5 & 0 & | & 6 \\ 0 & 6 & 0 & | & 5 \end{bmatrix}$$

$$R_4 \rightarrow R_4 - \frac{6}{5}R_3$$

$$\begin{bmatrix} -2 & 3 & 1 & | & 0 \\ -1 & 2 & 0 & | & 0 \\ 0 & 5 & 0 & | & 0 \\ 0 & 0 & 0 & | & 5 \end{bmatrix}$$

no solution

