

$$\begin{array}{ccccccccc}
4x_1 & + & 3x_2 & + & 3x_3 & - & 2x_4 & = & \lambda \\
-x_1 & - & x_2 & - & x_3 & + & x_4 & = & 2 \\
-19x_1 & - & 19x_2 & - & 20x_3 & + & (11 + \mu)x_4 & = & 6 - 2\lambda \\
4x_1 & + & 7x_2 & + & 8x_3 & + & x_4 & = & -2
\end{array}$$

$$\begin{array}{c}
3 \\
-20 \\
8
\end{array}
\left(\begin{array}{cccc|c}
4 & 3 & 3 & -2 & \lambda \\
-1 & -1 & -1 & 1 & 2 \\
-19 & -19 & -20 & 11 + \mu & 6 - 2\lambda \\
4 & 7 & 8 & 1 & -2
\end{array} \right)$$

$$\rightarrow \begin{array}{c} -1 \\ 1 \end{array} \left(\begin{array}{cccc|c}
1 & 0 & 0 & 1 & \lambda + 6 \\
-1 & -1 & -1 & 1 & 2 \\
1 & 1 & 0 & \mu - 9 & -2\lambda - 34 \\
-4 & -1 & 0 & 9 & 14
\end{array} \right)$$

$$\rightarrow \begin{array}{c} -3 \\ 3 \\ 4 \end{array} \left(\begin{array}{cccc|c}
1 & 0 & 0 & 1 & \lambda + 6 \\
3 & 0 & -1 & -8 & -12 \\
-3 & 0 & 0 & \mu & -2\lambda - 20 \\
-4 & -1 & 0 & 9 & 14
\end{array} \right)$$

$$\rightarrow \left(\begin{array}{cccc|c}
1 & 0 & 0 & 1 & \lambda + 6 \\
0 & 0 & -1 & -11 & -3\lambda - 30 \\
0 & 0 & 0 & \mu + 3 & \lambda - 2 \\
0 & -1 & 0 & 13 & 4\lambda + 38
\end{array} \right) -1$$

$$\rightarrow \left(\begin{array}{cccc|c}
1 & 0 & 0 & 1 & \lambda + 6 \\
0 & 0 & 1 & 11 & 3\lambda + 30 \\
0 & 0 & 0 & \mu + 3 & \lambda - 2 \\
0 & -1 & 0 & 13 & 4\lambda + 38
\end{array} \right)$$

$$\left| \begin{array}{ccc}
x_1 & + & x_4 & = & \lambda + 6 \\
x_3 & + & 11x_4 & = & 3\lambda + 30 \\
& & (\mu + 3)x_4 & = & \lambda - 2 \\
-x_2 & + & 13x_4 & = & 4\lambda + 38
\end{array} \right.$$

I $\mu = -3$

I.1 $\lambda = 2$

$$\left| \begin{array}{ccc}
x_1 & + & x_4 & = & \lambda + 6 \\
x_3 & + & 11x_4 & = & 3\lambda + 30 \\
& & 0x_4 & = & 0 \\
-x_2 & + & 13x_4 & = & 4\lambda + 38
\end{array} \right.$$

$$\rightarrow \left| \begin{array}{ccc} x_1 & + & x_4 & = & \lambda + 6 \\ x_3 & + & 11x_4 & = & 3\lambda + 30 \\ -x_2 & + & 13x_4 & = & 4\lambda + 38 \end{array} \right.$$

$$x_4 = p$$

$$\left| \begin{array}{ccc} x_1 & + & p & = & \lambda + 6 \\ x_3 & + & 11p & = & 3\lambda + 30 \\ -x_2 & + & 13p & = & 4\lambda + 38 \end{array} \right.$$

$$\rightarrow \left| \begin{array}{ccc} x_1 & = & \lambda + 6 - p \\ x_3 & = & 3\lambda + 30 - 11p \\ x_2 & = & 13p - 4\lambda - 38 \end{array} \right.$$

I.2 $\lambda \neq 2$

$$\left| \begin{array}{ccc} x_1 & + & x_4 & = & \lambda + 6 \\ x_3 & + & 11x_4 & = & 3\lambda + 30 \\ & & 0x_4 & = & \lambda - 2 \\ -x_2 & + & 13x_4 & = & 4\lambda + 38 \end{array} \right.$$

II $\mu \neq -3$

II.1 $\lambda = 2$

$$\left| \begin{array}{ccc} x_1 & + & x_4 & = & \lambda + 6 \\ x_3 & + & 11x_4 & = & 3\lambda + 30 \\ & & (\mu + 3)x_4 & = & 0 \\ -x_2 & + & 13x_4 & = & 4\lambda + 38 \end{array} \right.$$

$$\rightarrow \left| \begin{array}{ccc} x_1 & = & \lambda + 6 \\ x_3 & = & 3\lambda + 30 \\ x_4 & = & 0 \\ x_2 & = & -4\lambda - 38 \end{array} \right.$$

II.2 $\lambda \neq 2$

$$\left| \begin{array}{ccc} x_1 & + & x_4 & = & \lambda + 6 \\ x_3 & + & 11x_4 & = & 3\lambda + 30 \\ & & (\mu + 3)x_4 & = & \lambda - 2 \\ -x_2 & + & 13x_4 & = & 4\lambda + 38 \end{array} \right.$$

$$\rightarrow \left| \begin{array}{ccc} x_1 & + & \frac{\lambda-2}{\mu+3} & = & \lambda + 6 \\ x_3 & + & 11\frac{\lambda-2}{\mu+3} & = & 3\lambda + 30 \\ & & x_4 & = & \frac{\lambda-2}{\mu+3} \\ -x_2 & + & 13\frac{\lambda-2}{\mu+3} & = & 4\lambda + 38 \end{array} \right.$$

$$\rightarrow \left| \begin{array}{lcl} x_1 & = & \frac{(\lambda+6)(\mu+3)-(\lambda-2)}{\mu+3} \\ x_3 & = & \frac{(3\lambda+30)(11\mu+33)-(11\lambda-22)}{11\mu+33} \\ x_4 & = & \frac{\lambda-2}{\mu+3} \\ x_2 & = & -\frac{(4\lambda+38)(13\mu+39)-(13\lambda-26)}{13\mu+39} \end{array} \right.$$

$$\rightarrow \left| \begin{array}{lcl} x_1 & = & \frac{\lambda\mu+2\lambda+6\mu+20}{\mu+3} \\ x_3 & = & \frac{33\mu+88\lambda+330\mu+1012}{11\mu+33} \\ x_4 & = & \frac{\lambda-2}{\mu+3} \\ x_2 & = & -\frac{52\lambda\mu+143\lambda+494\mu+1498}{13\mu+39} \end{array} \right.$$