

# Quiz 5

## — solutions —

$$1) \quad K = \begin{pmatrix} 3 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 3 \end{pmatrix}$$

Gauss:  $\begin{pmatrix} 3 & -1 & 1 \\ 0 & 5/3 & -2/3 \\ 0 & -2/3 & 8/3 \end{pmatrix} \rightarrow \begin{pmatrix} 3 & -1 & 1 \\ 0 & 5/3 & -2/3 \\ 0 & 0 & 8/3 - 4/15 \end{pmatrix} \rightarrow 0$

$$2) \quad \begin{pmatrix} a & 2 \\ 2 & 4a \end{pmatrix} \rightarrow a > 0$$

$$\begin{pmatrix} a & 2 \\ 0 & 4(a - 1/2a) \end{pmatrix} \rightarrow 4(a - 1/2a) > 0$$

$$\Leftrightarrow a^2 - 1 > 0$$

$$\boxed{a > 1}$$

$$3) \quad x = K^{-1}f$$

$$2 \quad 1 \quad -1 \quad 4$$

$$1 \quad 2 \quad 1 \quad 5$$

$$-1 \quad 1 \quad 3 \quad 1$$

↪

$$2 \quad 1 \quad -1 \quad 4$$

$$0 \quad 3/2 \quad 3/2 \quad 3$$

$$0 \quad 3/2 \quad 5/2 \quad 3$$

↪

$$2 \quad 1 \quad -1 \quad 4$$

$$0 \quad 3/2 \quad 3/2 \quad 3$$

$$0 \quad 0 \quad 1 \quad 0$$

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$$z = 0$$

$$y = 2$$

$$x = 1$$

$$x = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$$

$$P(x) = x^T K x - 2f^T x + c$$
$$= -4$$