

$$\boxed{1} \quad \det \begin{pmatrix} 3 & 0 & 1 & -1 \\ -2 & 1 & -1 & -1 \\ 0 & -2 & 1 & 0 \\ 1 & -1 & 0 & 2 \end{pmatrix} = -6$$

2

$$(1) \det(A) = 0$$

$$(2) \tilde{A} = \begin{pmatrix} -1 & 1 & -2 \\ 2 & -2 & 4 \\ -1 & 1 & -2 \end{pmatrix}$$

$$(3) A\tilde{A} = O$$

3

$$(1) \det(A) = 1$$

$$(2) x = \frac{\det \begin{pmatrix} 0 & 0 & 2 \\ 1 & 1 & -1 \\ 2 & 1 & -2 \end{pmatrix}}{\det(A)} = -2$$

$$y = \frac{\det \begin{pmatrix} 1 & 0 & 2 \\ 3 & 1 & -1 \\ 2 & 2 & -2 \end{pmatrix}}{\det(A)} = 8$$

$$z = \frac{\det \begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & 1 \\ 2 & 1 & 2 \end{pmatrix}}{\det(A)} = 1$$