

# EX.1

$$\begin{aligned}
 a) \det A &= \begin{vmatrix} 2 & a & 1 \\ 3 & -2 & 1 \\ 1 & 1 & 2 \end{vmatrix} = 2 \begin{vmatrix} -2 & 1 \\ 1 & 2 \end{vmatrix} - a \begin{vmatrix} 3 & 1 \\ 1 & 2 \end{vmatrix} + 1 \begin{vmatrix} 3 & -2 \\ 1 & 1 \end{vmatrix} \\
 &= -10 - 5a + 5 = -5(a+1)
 \end{aligned}$$

$A^{-1}$  existerar  $\Leftrightarrow \det A \neq 0 \Leftrightarrow a \neq -1$ .

$$\begin{aligned}
 b) \det A_1 &= \begin{vmatrix} a^2+1 & a & 1 \\ 3 & -2 & 1 \\ 1 & 1 & 2 \end{vmatrix} = (a^2+1) \cdot (-5) - a \cdot 5 + 1 \cdot 5 = \\
 &= -5a^2 - 5 - 5a + 5 = -5a(a+1)
 \end{aligned}$$

$$\rightarrow X = \frac{\det A_1}{\det A} = \frac{-5a(a+1)}{-5(a+1)} = a \text{ för } a \neq -1.$$

$$\begin{aligned}
 c) M &= \begin{bmatrix} 2 & -1 & 1 & 2 \\ 3 & -2 & 1 & 3 \\ 1 & 1 & 2 & 1 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 2 & 1 \\ 3 & -2 & 1 & 3 \\ 2 & -1 & 1 & 2 \end{bmatrix} \sim \begin{bmatrix} 1 & 1 & 2 & 1 \\ 0 & -5 & -5 & 0 \\ 0 & -3 & -3 & 0 \end{bmatrix} \sim \\
 &\sim \begin{bmatrix} 1 & 1 & 2 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & -3 & -3 & 0 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}
 \end{aligned}$$

X och y bundna variabler, 2 fri variabler

$$\begin{cases} X = 1 - t \\ Y = -t \\ Z = t \end{cases}$$

EX. 2

$$\text{Area}(\text{bild}) = |\det A| \cdot \text{Area}(\text{start})$$

$$( T(S) = |\det A| \cdot S )$$

$$\text{Area}(\text{bild}) = \left| \begin{vmatrix} 4 & 3 \\ 2 & -2 \end{vmatrix} \right| = |-14| = 14$$

$$\text{Area}(\text{start}) = 7$$

$$\det A = \begin{vmatrix} 1 & 1 \\ 2 & a \end{vmatrix} = a - 2$$

$$\Rightarrow |\det A| = |a - 2|$$

Vi har då

$$14 = |a - 2| \cdot 7$$

$\Leftrightarrow$

$$|a - 2| = 2$$

Fall I.

$$-(a - 2) = 2$$

$\Leftrightarrow$

$$\underline{\underline{a = 0}}$$

Fall II

$$a - 2 = +2$$

$\Leftrightarrow$

$$\underline{\underline{a = 4}}$$