

Linear Algebra I

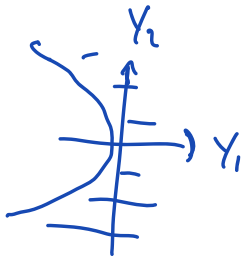
solution if $Y_2^2 + 4Y_1 \geq 0$
 $X_2^2 + Y_2 X_2 - Y_1$

$$X_1 X_2 = Y_1 \quad (Y_2 + X_2) X_2 = Y_1$$

$$X_1 - X_2 = Y_2 \quad X_1 = Y_2 + X_2$$

$$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\begin{aligned} X_1 X_2 &= 1 & (1+X_2) X_2 &= 1 \Rightarrow X_2^2 + X_2 - 1 = 0 \\ X_1 - X_2 &= 1 & X_1 &= 1 + X_2 \end{aligned}$$



$$Y_1 \geq -\frac{Y_2^2}{4}$$

$$f: \mathbb{R}^2 \rightarrow \mathbb{R}^2$$

$$\begin{pmatrix} X_1 \\ X_2 \end{pmatrix} \mapsto \begin{pmatrix} X_1 \cdot X_2 \\ X_1 - X_2 \end{pmatrix}$$

if $Y_2^2 + 4Y_1 \geq 0$

$$X_2 = \frac{-Y_2 \pm \sqrt{Y_2^2 + 4Y_1}}{2}$$

$$\begin{aligned} X_1 &= Y_2 + X_2 \\ &= \frac{Y_2 \pm \sqrt{Y_2^2 + 4Y_1}}{2} \end{aligned}$$

e.g. $\begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

$$X_1 = \frac{1 \pm \sqrt{1+4}}{2} = \frac{1 \pm \sqrt{5}}{2}$$

$$X_2 = \frac{-1 \pm \sqrt{5}}{2}$$

$X^2 + ax - b = 0$ solutions:

$$\begin{aligned} X^2 + ax + \left(\frac{a}{2}\right)^2 &= \left(\frac{a}{2}\right)^2 + b \\ \left(X + \frac{a}{2}\right)^2 &= \frac{a^2 + 4b}{4} \\ X &= \frac{-a \pm \sqrt{a^2 + 4b}}{2} \end{aligned}$$

