$$\frac{d}{dt} : P_1 \to P_1$$

$$\alpha_0 t^0 + \alpha_1 t^1 \longmapsto \alpha_1 t^0$$

Basis in P_1 $\mathcal{A} = \{\underset{v_1}{t^0}, \underset{v_2}{t^1}\}$, Basis in P_1 $\mathcal{B} = \{\underset{w_1}{t^0}, \underset{w_2}{t^1}\}$

Bild des 1. Basisvektors $t^0 \longmapsto 0 = 0 \cdot t^0 + 0 \cdot t^1$

$$v_1 \longmapsto 0 = 0 \cdot w_1 + 0 \cdot w_2$$

2. Basisvektors $t^1 \longmapsto 1 \cdot t^0 + 0 \cdot t^1$

$$v_2 \longmapsto 1 w_1 + 0 w_2$$

Basisdarstellung in $\mathcal{B}$

$$\Rightarrow A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$$

$$T^{-1} A T = A$$

$$f_A : v \longrightarrow \frac{d}{dt} v$$

$$\alpha_1 v_1 + \alpha_2 v_2 \longmapsto \alpha_1 \frac{d}{dt} v_1 + \alpha_2 \frac{d}{dt} v_2 \quad . \; \blacksquare$$

Andere Basis

$$\tilde{\mathcal{A}} = \{\underset{v_1}{t^1}, \underset{v_2}{t^0 - t^1}\} \quad (\hat{=}\, t, 1-t) \qquad \tilde{\mathcal{B}} = \{\underset{w_1}{t^1}, \underset{w_2}{t^0 - t^1}\}$$

Bild von $\underset{v_1}{t^1} \longmapsto 1 \cdot t^0 \overset{!}{=} \alpha_1 w_1 + \alpha_2 w_2$

$$t^0 = \alpha_1 t^1 + \alpha_2 (t^0 - t^1)$$
$$= \alpha_1 t^1 + \alpha_2 t^0 - \alpha_2 t^1$$
$$\Rightarrow \alpha_2 = 1, \quad \alpha_1 = \alpha_2 = 1$$
$$= 1 \cdot w_1 + 1 \cdot w_2$$

$$t^1 \longmapsto 0 - t^0 \overset{!}{=} \alpha_1 w_1 + \alpha_2 w_2$$
$$= \alpha_1 t^1 + \alpha_2 t^0 - \alpha_2 t^1$$
$$\Rightarrow \alpha_2 = -1, \quad \alpha_1 = \alpha_2 = -1$$
$$= (-1) w_1 + (-1) w_2$$

$$A = \begin{bmatrix} 1 & -1 \\ 1 & -1 \end{bmatrix}$$

Basis des $\mathbb{R}^2$

$\left\{ \begin{pmatrix}1\\0\end{pmatrix}, \begin{pmatrix}0\\1\end{pmatrix} \right\}$; $\left\{ \begin{pmatrix}1\\1\end{pmatrix}, \begin{pmatrix}1\\-1\end{pmatrix} \right\}$

↑ l. unabh. da $\begin{bmatrix}1 & 1\\0 & -2\end{bmatrix} = ZSF$

Abb. $x \longmapsto f(x)$

$$\begin{pmatrix}x_1\\x_2\end{pmatrix} \longmapsto \begin{pmatrix}2x_1 + x_2\\x_2 - 2x_1\end{pmatrix}$$

a) linear ?

b) $\mathcal{A} = \left\{ \begin{pmatrix}1\\0\end{pmatrix}, \begin{pmatrix}0\\1\end{pmatrix} \right\} = \mathcal{B}$

$$\left.\begin{array}{l} \begin{pmatrix}1\\0\end{pmatrix} \longmapsto \begin{pmatrix}2+0\\0-2\end{pmatrix} \\ \begin{pmatrix}0\\1\end{pmatrix} \longmapsto \begin{pmatrix}0+1\\1-0\end{pmatrix} \end{array}\right\} A = \begin{bmatrix}2 & 1\\-2 & 1\end{bmatrix}$$

c) $\mathcal{A} = \left\{ \begin{pmatrix}1\\0\end{pmatrix}, \begin{pmatrix}0\\1\end{pmatrix} \right\}$, $\mathcal{B} = \left\{ \begin{pmatrix}1\\1\end{pmatrix}, \begin{pmatrix}1\\-1\end{pmatrix} \right\}$

$$\begin{pmatrix}1\\0\end{pmatrix} \mapsto \begin{pmatrix}2\\-2\end{pmatrix} = 2\cdot\begin{pmatrix}1\\0\end{pmatrix} + (-2)\begin{pmatrix}0\\1\end{pmatrix} \overset{!}{=} \alpha_1\begin{pmatrix}1\\1\end{pmatrix} + \alpha_2\begin{pmatrix}1\\-1\end{pmatrix} \quad \mathrm{I}$$

$$\begin{pmatrix}0\\1\end{pmatrix} \mapsto \begin{pmatrix}1\\1\end{pmatrix} = (1)\begin{pmatrix}1\\0\end{pmatrix} + (1)\begin{pmatrix}0\\1\end{pmatrix} \overset{!}{=} \beta_1\begin{pmatrix}1\\1\end{pmatrix} + \beta_2\begin{pmatrix}1\\-1\end{pmatrix} \quad \mathrm{II}$$

I: $\begin{bmatrix}1 & 1\\1 & -1\end{bmatrix}\begin{pmatrix}\alpha_1\\\alpha_2\end{pmatrix} = \begin{pmatrix}2\\-2\end{pmatrix}$ $\quad \left[\begin{array}{cc|cc}1 & 1 & 2 & 1\\1 & -1 & -2 & 1\end{array}\right]$ $\quad \alpha_1 = 0$, $\alpha_2 = 2$

II: $\begin{bmatrix}1 & 1\\1 & -1\end{bmatrix}\begin{pmatrix}\beta_1\\\beta_2\end{pmatrix} = \begin{pmatrix}1\\1\end{pmatrix}$ $\quad \left[\begin{array}{cc|cc}1 & 1 & 2 & 1\\0 & -2 & -4 & 0\end{array}\right]$ $\quad \beta_1 = 1$, $\beta_2 = 0$

$$A = \begin{bmatrix}0 & 1\\2 & 0\end{bmatrix}$$

d) $\mathcal{A} = \mathcal{B}$ $\qquad \mathcal{B} = \mathcal{A}$ $\begin{bmatrix}3 & 1\\-1 & -3\end{bmatrix}$

e) $\mathcal{A} = \mathcal{B}$ $\qquad \mathcal{B} = \mathcal{B}$ $\begin{bmatrix}1 & -1\\2 & 2\end{bmatrix}$

Entwicklung nach der letzten Spalte

$$(-1)^{1+n}(-a_0)\cdot\det I_{n-1} = (-1)^{n+1}(-1)\cdot a_0 = (-1)^n\cdot a_0$$

$$\begin{bmatrix} -\lambda & 0 & \cdots & 0 & -a_0 \\ 1 & -\lambda & \ddots & 0 & -a_1 \\ 0 & 1 & -\lambda & & \vdots \\ \vdots & & \ddots & \ddots & \vdots \\ 0 & \cdots & 0 & 1 & -a_{n-1}-\lambda \end{bmatrix}$$

Entwicklung ~~nach der~~ letzte Spalte

(~~...~~)

$$(-1)^{n+1}(-a_0)\cdot\det\begin{bmatrix} 1 & -\lambda & \cdots & 0 \\ 0 & 1 & \ddots & \\ \vdots & & \ddots & -\lambda \\ 0 & \cdots & 0 & 1 \end{bmatrix} = (-1)^{n+1}(-a_0)\cdot 1$$

$(-1)^{n+2} = (-1)^n$

$$+(-1)^{n+2}(a_1)\cdot\det\begin{bmatrix} -\lambda & 0 & \cdots & 0 \\ 0 & 1 & -\lambda & +0 \\ & & \ddots & 0 \\ & & & 1 \end{bmatrix} = (-1)^{n+2}(-a_1)\cdot(-\lambda)$$

$(-1)^{n+2+2} = (-1)^n$

$$+(-1)^{n+3}(-a_2)\cdot\det\begin{bmatrix} -\lambda & 0 & \cdots & 0 \\ 1 & -\lambda & \cdots & 0 \\ 0 & 0 & 1 & \vdots \\ & & \ddots & 1 \end{bmatrix} = (-1)^{n+3}(-a_0)(-\lambda)^2$$

$= (-1)^{n+3+3} = (-1)^n$

$\vdots$

$$(-1)^{n+n}(-a_{n-1})\cdot\det\begin{bmatrix} -\lambda & 0 & \cdots & 0 \\ 1 & -\lambda & & 0 \\ & \ddots & \ddots & \\ 0 & & 1 & -\lambda \end{bmatrix} = (-1)^{n+n}(-a_{n-1})(-\lambda)^{n-1}$$

$(-1)^{n+n+n} = (-1)^n$

$$= (-1)^n\left\{a_0 + a_1\lambda + a_2\lambda^2 + \dots + a_{n-1}\lambda^{n-1}\right\} \in P_{n-1} \quad \blacksquare$$

allocated. When trying to install a guest OS on this image, the first write accesses to a sector in the middle of the image will be delayed for a long time on Windows hosts. This might confuse the guest and make installing a guest impossible (for example, **creating a partition fails**). Starting with VirtualBox 1.5.6 we will write the whole file once during creation. Users of current versions should select a *dynamically expanding* image which does not have this limitation.
(Fixed since VirtualBox 1.5.6)

Windows Shared Folders

- I cannot see my newly created shared folder under "My Network Places". Under Windows 2000 they're visible, but not under Windows XP / Windows Vista. This is because of the standard settings of these two.
  To get it working the way it was, just do the following steps:
  1. Open the Explorer
  2. In the menu go to "Tools" and select "Folder Options"
  3. Under tab "General" activate "Use Windows classic folders"

  Now the "Entire Network" as well as the shared folder entries are visible again.

Windows minidumps

To debug application crashes on Windows hosts and guests, minidumps are very helpful. Please have a look at http://support.microsoft.com/kb/315263. If VirtualBox crashes on a Windows host or a Windows guest application crashes please add the appropriate minidump to the bug report.

Windows 98 guests

- **High CPU load while running Windows 98** Windows 98 does not execute the 'hlt' instruction, which temporarily turns off the CPU, when it has no work to do. Download and install rain20 from here.

- **Poor graphical output in Windows 98** Unlike more modern systems, Windows 98 does not come with a driver which will work with the VirtualBox graphics card, so it falls back to using it as a 16 color VGA card. While Sun does not provide Guest Additions for Windows 98, the Display Doctor 7 Beta suite by the company SciTech does contain a driver which will allow you to use higher color and resolution graphics modes. Please note that neither Sun nor SciTech support nor accept liability for the use of this program.

  Display Doctor 7 Beta requires activation codes to work. We understand that the free activation code for Display Doctor 6 also applies to version 7 Beta: http://www.scitechsoft.com/ftp/sdd/regcodes.txt.

  You might also want to look at the following site pointed out by users of VirtualBox, which also provides VESA drivers for Windows 98: http://www.bearwindows.boot-land.net/vbe9x.htm. Please be aware that Sun provides this link in good faith, but cannot take responsibility for the site or the software which it refers to.