Blatt 7
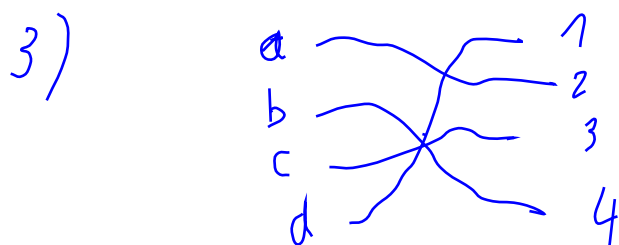
1) Pf. nicht füttern aber anfassen

~ Pf. weder füttern noch anfassen

2) a) v ist $\perp$ zum gesamten VR U

d.h. Alle u aus U sind $\perp$ zu v

b) $\forall r \in \mathbb{R}^3 : r \in E \land \lnot(r \perp n) \Rightarrow \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \notin E$

c)

3)

a, b, c, d matched to 1, 2, 3, 4

4) S_1 Ja, $|x|_2 = \sqrt{x_1^2 + x_2^2}$

S_2 Nein

S_3 Nein

b) $v = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ $w = \begin{pmatrix} 0 \\ 2 \end{pmatrix}$

$S_1(v,w) = 1 \cdot 0 + 2 \cdot 0 = 0 \Rightarrow \perp$

$S_2(v,w) = 1 \cdot 0 + \underset{4}{1} \cdot 0 \cdot 2 = 0 \Rightarrow \perp$

$S_3(v,w) = 0 \qquad \Rightarrow \perp$

c) $\cos^{-1}\left(\dfrac{1\cdot 2 + 1\cdot(-1)}{\sqrt{1^2+1^2}\cdot\sqrt{2^2+(-1)^2}}\right)$ $\cos^{-1}\left(\dfrac{1}{\sqrt{2}\cdot\sqrt{5}}\right)$

d) $s_3 = 3\cdot 1\cdot 1 + 2\cdot 1\cdot\alpha = 0$

$$3 + 2\alpha = 0$$

$$\alpha = -\frac{3}{2}$$

5)

a) $s(a,b) = 1\cdot(-1) + 1\cdot 2 = 1$

b) $|a|_2 = \sqrt{1^2+1^2} = \sqrt{2}$

$|b|_2 = \sqrt{-1^2+2^2} = \sqrt{5}$

c)

d) $s = 0$

$$1\cdot\alpha + 1\cdot(-1) = 0$$

$$\alpha = 1$$

e) $|b|_2 = \sqrt{5} \implies \tilde{b} = \frac{1}{\sqrt{5}}b$

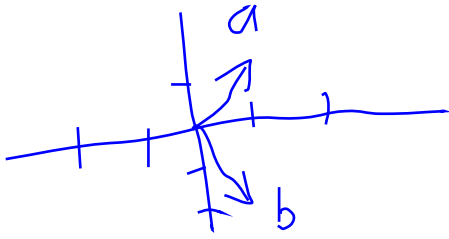f) $b = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ $\quad -1a + 2b = 0$ $\quad a = 1$

$\qquad\qquad\qquad -1\cdot 1 + 2b = 0$

$\qquad\qquad\qquad\qquad -1 + 2b = 0$

$b^+ = \begin{pmatrix} 1 \\ 0{,}5 \end{pmatrix}$ $\qquad\qquad\qquad b = 0{,}5$

g) $a \times b = 1 \cdot 2 - 1 \cdot (-1) = 3$

h) $|b| = \sqrt{5}$

$\tilde{b} = \frac{6}{\sqrt{5}} \cdot \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\qquad$ $|\tilde{b}| = 6$