skalarni soucin

- $||v|| \geq 0$ a 0 nastane pouze pro $v = 0$
- $||\alpha v|| = |\alpha| ||v||$
- $||u + v|| \leq ||u|| + ||v||$

priklady norem:
na jednotkove kruznici: (manhatonova norma)
$1 = \sqrt{x^2 + (x - y)^2 + y^2}$
nam vykresli elipsu

cebisevova norma nam vykresli "ctverec"kde se s rostoui odmocninou kulati rohy

tvrzeni:
pro normy ind. skalarnich soucinem plati:
$||x - y||^2 + ||x + y||^2 = 2||x||^2 + 2||y||^2$

u **a** v **jsou kolme prave kdyz:** $\langle u|v \rangle = 0$

28.02.

$$||x|| = \sqrt{\langle x, x \rangle}$$
$$z_i' = \frac{z_i}{||z_i||}$$
$$x_2 = \langle x_2|z_1 \rangle z_1 + \langle x_2|z_2 \rangle z_2;\ y_2 = x_2 - \langle y_2|z_1 \rangle z_1$$

$x_1 = (2, 0, 1, 2)^T$
$x_2 = (4, 3, 2, 4)^T$
$x_3 = (6, -5, 3, 6)^T$
$x_4 = (6, -5, 3, 6)^T$
... znormalizujeme
$z_1 = (\frac{2}{3}, 0, \frac{1}{3}, \frac{2}{3})$
$z_2 = (0, 1, 0, 0)$
$y_3 = (0, 0, 0, 0)$
$z_4 = (\frac{1}{3}, 0, \frac{2}{3}, \frac{-2}{3})$

6.3.

test na ortogonalni vektory v R^3

$x_1 = (1, 2, 3, 4)^T \ldots ||x_1|| = \sqrt{30}$
$x_2 = (2, 4, 2, 1)^T \ldots ||x_2|| = \sqrt{25} = 5$
$x_3 = (-1, -2, -2, -1)^T \ldots ||x_3|| = \sqrt{10}$

Gram–Schmidt:
$proj_u(v) = \frac{\langle v,u \rangle}{\langle u,u \rangle} u$

$u_1 = x_1 = (1, 2, 3, 4)^T$
$u_2 = x_2 - proj_{u_1}(v_2)$
$u_3 = x_3 - proj_{u_1}(v_3) - proj_{u_2}(v_3)$

normalizace:
$z_i = \frac{y_i}{||y_i||}$

$$A = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 4 & 1 & 4 & 1 \\ 1 & 2 & 3 & 4 \end{pmatrix}$$
$x = (2, 2, 1, 5)^T$
Urcete projekci x do $R(A)$

Fourierovy koeficienty:
$x = \sum_{i=1}^{n} \langle x, z_i \rangle z_i$

6.3.

Spoctete vzdalenost bodu $A = (5, 5, 3, 3)^T$
od roviny prochazejici body:

- $B = (8, -1, 1, -2)^T$
- $C = (4, -2, 2, -1)^T$
- $D = (0, 0, 0, 0)^T$