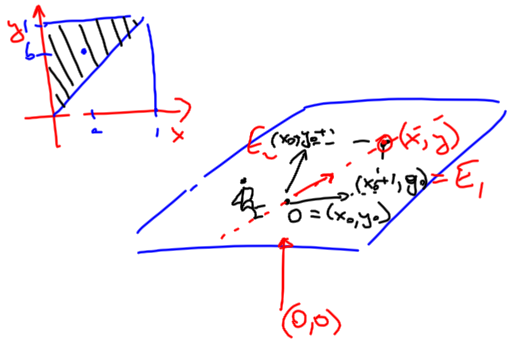
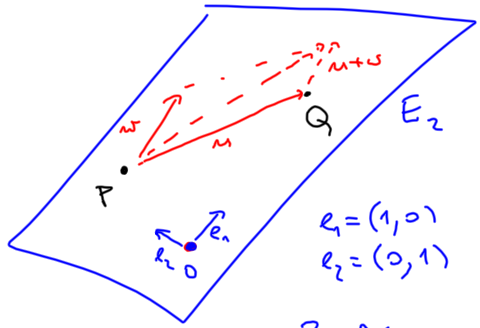


10 1-16:04



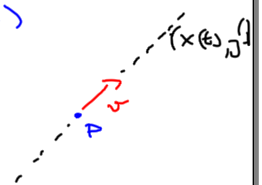
$e_1 = (1,0)$
$e_2 = (0,1)$

$E_2 = \mathbb{R}^2 = \{(a,b);\ a,b \in \mathbb{R}\}$

10 1-16:10

$P = [1,1] \qquad v = (-1,3)$

$$\boxed{\begin{aligned} x(t) &= 1 + (-1)\cdot t \\ y(t) &= 1 + 3\cdot t \end{aligned}}$$



$P = [x_0, y_0]$
$v = (\alpha, \beta)$
$\nu = (-\beta, \alpha)$

$$\boxed{\begin{aligned} x &= x_0 + \alpha t \\ y &= y_0 + \beta t \end{aligned}}$$

$$\boxed{\alpha\cdot(-\beta) + \beta\cdot\alpha = 0}$$

10 1-16:14

Př.

$p:\ [2,0] + t(3,2)$
$q:\ [-1,2] + s(1,3)$

$p \cap q = ?$

1) $\overbrace{2+3t}^{x} = -1+s \quad /\cdot 3$
$\underbrace{2t}_{y} = 2+3s$

$6 + 7t = -5$
$7t = -11$
$\boxed{t = -\frac{11}{7}}$

$\left(2 - \frac{33}{7}, -\frac{22}{7}\right) = \left[-\frac{19}{7}, -\frac{22}{7}\right]$

$p:\ x = 2+3t = 2 + \frac{3}{2}y$
$\quad\ y = 2t$

$\boxed{2x - 3y - 4 = 0}$

$2(-1+s) - 3(2+3s) - 4$
$= -12 - 7s = 0$

$\boxed{s = -\frac{12}{7}}$

10 1-16:20

2 rovnice po 2 prom.: rovnice přímky

$\boxed{ax + by = r}$
$cx + dy = s$ } průnik $\quad A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$F(x,y) = \begin{pmatrix} ax + by \\ cx + dy \end{pmatrix} = \begin{pmatrix} r \\ s \end{pmatrix}$

$(0,1) = e_2$
$e_1 = (1,0)$
$x\cdot e_1 + y\cdot e_2 = (x,y)$

$v = (x_1, y_1) \qquad \alpha v = (\alpha x_1, \alpha x_2)$
$w = (x_2, y_2) \qquad v + w = (x_1 + x_2, y_1 + y_2)$

$F(\alpha v + \beta w) = \alpha F(v) + \beta F(w)$
$F(x,y) = x\cdot F(e_1) + y\cdot F(e_2)$

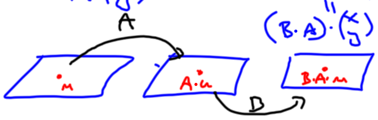
10 1-16:30

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \cdot \begin{pmatrix} a' & b' \\ c' & d' \end{pmatrix} = \begin{pmatrix} aa' + bc' & ab' + bd' \\ ca' + dc' & cb' + dd' \end{pmatrix}$$

$A \cdot B = \nearrow$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} a' & b' \\ c' & d' \end{pmatrix} = \begin{pmatrix} a' & b' \\ c' & d' \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} \xmapsto{A} A\cdot\begin{pmatrix} x \\ y \end{pmatrix} \xmapsto{B} B\cdot\left(A\cdot\begin{pmatrix} x \\ y \end{pmatrix}\right) = (B\cdot A)\cdot\begin{pmatrix} x \\ y \end{pmatrix}$$



10 1-16:38

$p: \; ax + by = r$

$q: \; cx + dy = s$

v $\mathbb{R}$: $ax = b$, $a \neq 0$ ⇔ $\exists!\, x$

rovnoběžné ⇔

$a = \lambda c \quad /\cdot d$

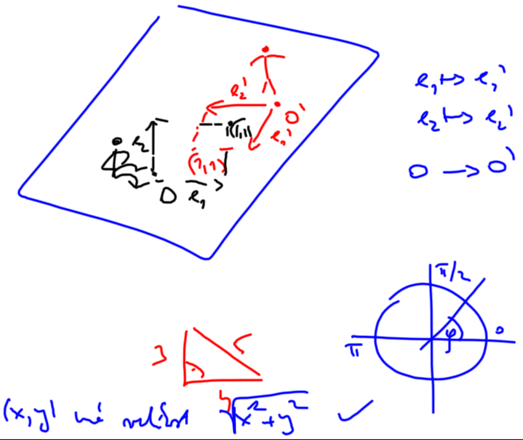
$b = \lambda d \quad /\cdot c$

$\boxed{ad - bc} = \lambda\cdot(cd - cd) = 0$

$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \longmapsto \boxed{\det A = ad - bc}$

$\det A \neq 0 \Leftrightarrow A\cdot u = w$ má právě jedno řešení u $\forall\, w$.

10 1-16:49



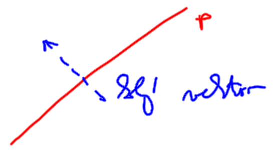
$e_1 \mapsto e_1'$

$e_2 \mapsto e_2'$

$O \to O'$

$(x,y)'$ má velikost $\sqrt{x^2+y^2}$ ✓

10 1-16:53



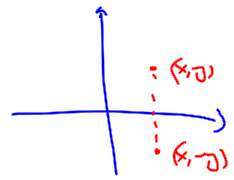
kolmý vektor

$v = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$ $\quad v\cdot w = x_1x_2 + y_1y_2$

$w = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$ $\quad \cos\varphi = \dfrac{x_1\cdot x_2 + y_1 y_2}{\|v\|\cdot\|w\|}$

10 1-17:01

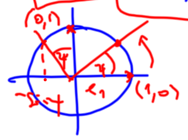
$A = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\cdot\begin{pmatrix} x \\ y \end{pmatrix}$



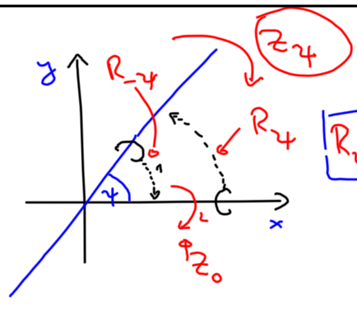
(x,y)

$(x,-y) = A\cdot\begin{pmatrix} x \\ y \end{pmatrix}$

$R_\varphi = \begin{pmatrix} \cos\varphi & -\sin\varphi \\ \sin\varphi & \cos\varphi \end{pmatrix}$



10 1-17:09



$\boxed{R_\varphi \cdot Z_0 \cdot R_{-\varphi}} \cdot \begin{pmatrix} x \\ y \end{pmatrix}$

$\parallel$

Z_φ

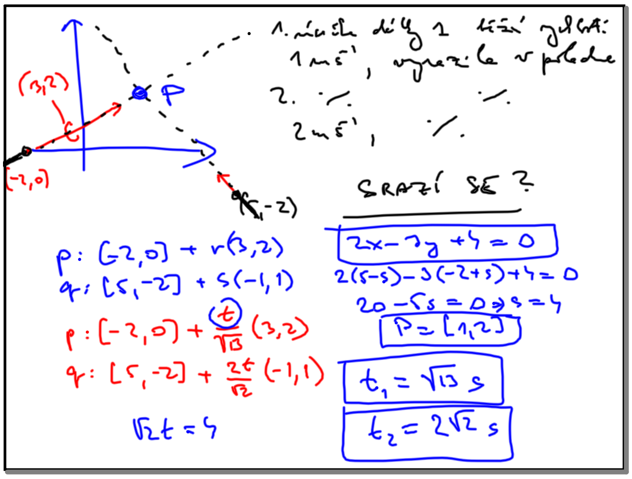
10 1-17:14

$\begin{pmatrix} \cos\varphi & -\sin\varphi \\ \sin\varphi & \cos\varphi \end{pmatrix}\cdot\begin{pmatrix} \cos\varphi & \sin\varphi \\ +\sin\varphi & -\cos\varphi \end{pmatrix}$

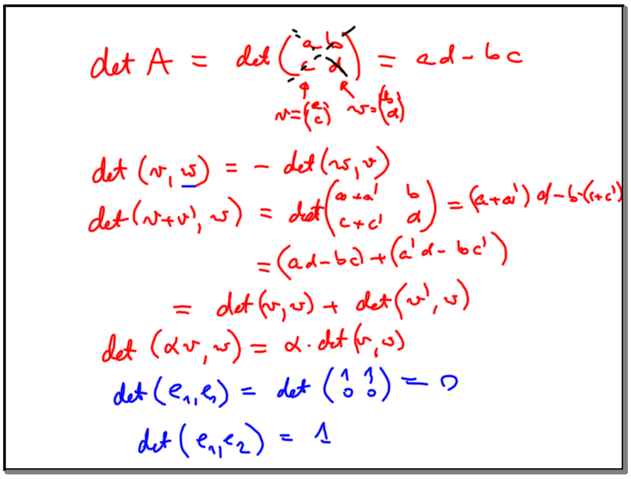
$= \begin{pmatrix} \cos^2\varphi - \sin^2\varphi & +\cos\varphi\sin\varphi + \sin\varphi\cos\varphi \\ \sin\varphi\cos\varphi + \cos\varphi\sin\varphi & \sin^2\varphi - \cos^2\varphi \end{pmatrix}$

$= \begin{pmatrix} \cos 2\varphi & \sin 2\varphi \\ \sin 2\varphi & -\cos 2\varphi \end{pmatrix}$

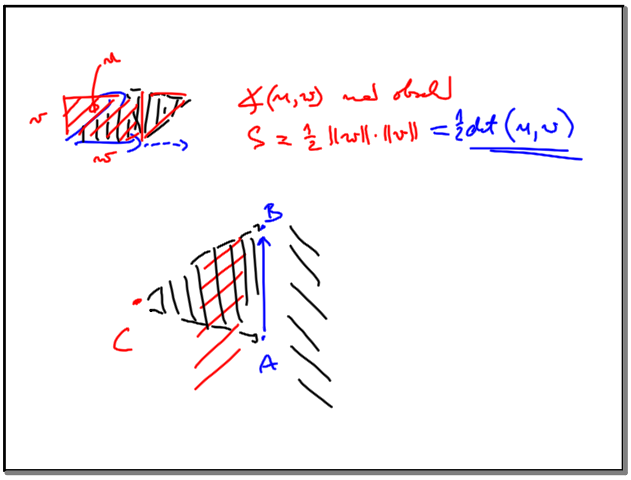
10 1-17:18



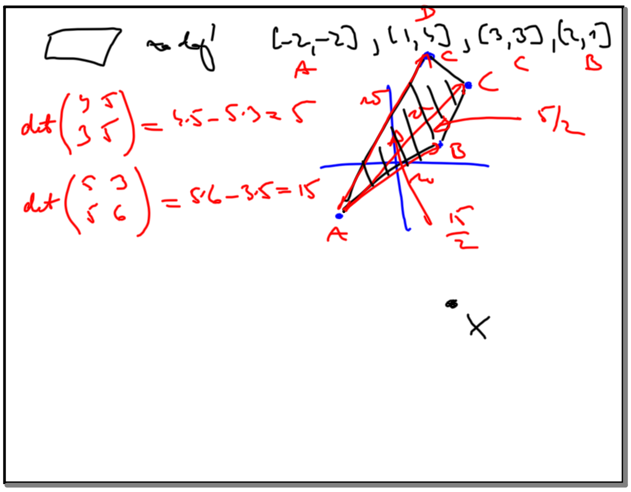
10 1-17:23



10 1-17:36



10 1-17:41



10 1-17:46