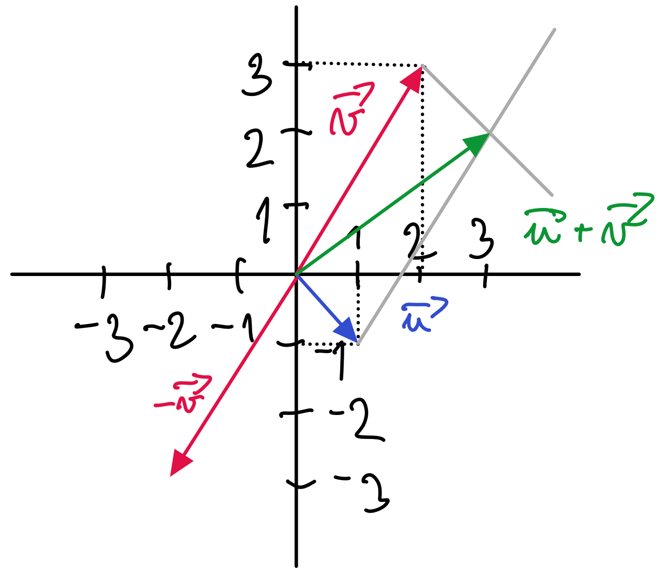
① Nech $\vec{u} = [1,-1]$ $\vec{v} = [2,3]$. Nakreslite $\vec{u}+\vec{v}$, $-\vec{v}$, $\vec{u}-\vec{v}$, $\vec{v}-\vec{u}$, $2\vec{u}$



②

Nech $\vec{u} = [1,-1,0]$ $\vec{v} = [2,-4,1]$. Vypočítajte $\vec{u}+\vec{v}$, $\vec{u}-\vec{v}$, $\vec{v}-\vec{u}$, $-2\vec{v}+2\vec{u}$

$\vec{u}+\vec{v} = [1,-1,0]+[2,-4,1] = [3,-5,1]$

$\vec{u}-\vec{v} = [1,-1,0]-[2,-4,1] = [1-2,-1-(-4),0-1] =$
$= [-1,3,-1]$

$\vec{v}-\vec{u} = [2,-4,1]-[1,-1,0] = [2-1,(-4)-(-1),1-0] =$
$= [1,-3,1]$

③ Nech $\vec{u} = [-2,1]$ $\vec{v} = [2,1]$. Vyjadrite $[-2,2]$ ako lineárnu kombináciu $\vec{u}, \vec{v}$.

$[-2,2] = a[-2,1] + b[2,1]$ $\quad a,b = ?$

$[-2,2] = [-2a, a] + [2b, b]$

$[-2,2] = [-2a+2b, a+b]$

$-2 = -2a + 2b$

$2 = a + b \Rightarrow a = 2 - b$

$-2 = -2a + 2b \Rightarrow -2 = -2(2-b) + 2b =$

$(-2).2 - (-2)b + 2b = -4 + 2b + 2b = -4 + 4b$

$-2 = -4 + 4b \quad / \cdot \frac{1}{2}$

$-1 = -2 + 2b \quad / + 2$

$1 = 2b$

$\frac{1}{2} = b$

$a = 2 - b = 2 - \frac{1}{2} = \frac{3}{2}$

$[-2,2] = \frac{3}{2}[-2,1] + \frac{1}{2}[2,1]$

(4) Nech $\vec{u} = [-1, 0, 1]$ $\vec{v} = [2, 2, 1]$.

Vypočítajte $\vec{u} \cdot \vec{v}$, $\vec{v} \cdot \vec{u}$, $\vec{u} \cdot \vec{u}$, $|\vec{u}|$, $|\vec{v}|$

$\vec{u} \cdot \vec{v} = (-1) \cdot 2 + 0 \cdot 2 + 1 \cdot 1 = -2 + 0 + 1 = -1$

$\vec{v} \cdot \vec{u} = -1$

$\vec{u} \cdot \vec{u} = (-1) \cdot (-1) + 0 \cdot 0 + 1 \cdot 1 = 1 + 0 + 1 = 2$

$|\vec{u}| = \sqrt{\vec{u} \cdot \vec{u}} = \sqrt{2}$

$|\vec{v}| = \sqrt{\vec{v} \cdot \vec{v}} = \sqrt{2^2 + 2^2 + 1^2} = \sqrt{9} = 3$

(4) Nech $\vec{u} = [-3, 2]$. Nájdite dva nenulové vektory $\vec{v}$ také, že $\vec{u} \cdot \vec{v} = 0$. Potom ich nakreslite.

$\vec{v} = [v_1, v_2]$

$\vec{u} \cdot \vec{v} = 0$

$[-3, 2] \cdot [v_1, v_2] = 0$

$-3v_1 + 2v_2 = 0$ Vezmime $v_1 = 1$

$-3 \cdot 1 + 2v_2 = 0$

$2v_2 = 3 \Rightarrow v_2 = \frac{3}{2}$ $[1, \frac{3}{2}]$

$v_1 = 2$

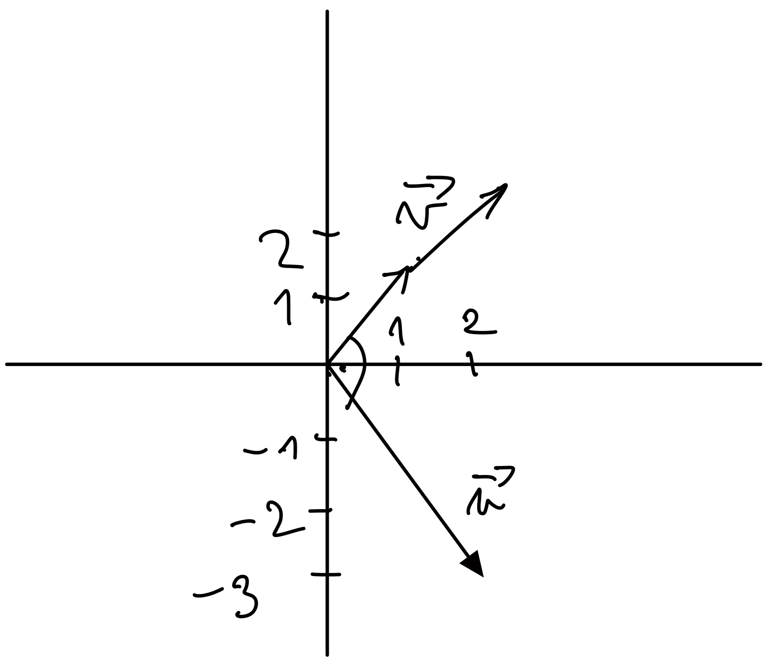
$(-3)\,2 + 2v_2 = 0$

$-6 + 2v_2 = 0$

$-3 + v_2 = 0$

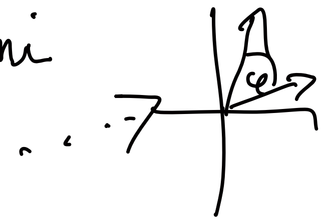
$v_2 = 3$

$[2, \frac{3}{2}]$



(4) Určte uhol zovretý vektormi

$\vec{u} = [2,1] \qquad \vec{v} = [1,3]$



$$\vec{u}\cdot\vec{v} = |\vec{u}|\,|\vec{v}|\cos\varphi$$

$$\vec{u}\cdot\vec{v} = 2.1 + 1.3 = 5$$

$$|\vec{u}| = \sqrt{\vec{u}\cdot\vec{u}} = \sqrt{2^2+1^2} = \sqrt{5}$$

$$|\vec{v}| = \sqrt{\vec{v}\cdot\vec{v}} = \sqrt{1^2+3^2} = \sqrt{10}$$

$$5 = \sqrt{5}\sqrt{10}\cos\varphi = \sqrt{5}.\sqrt{2.5}\cos\varphi =$$

$$= \sqrt{5}.\sqrt{2}\sqrt{5}\cos\varphi =$$

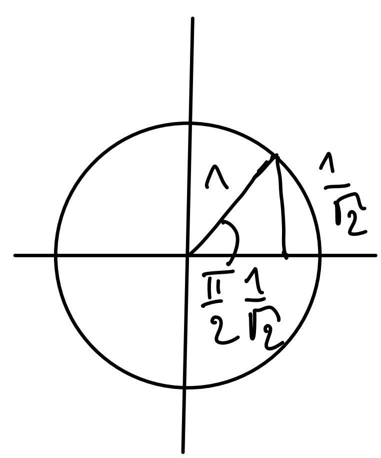
$$= \sqrt{2}.5\cos\varphi$$

$$5 = \sqrt{2}\,5\cos\varphi$$

$$1 = \sqrt{2}.\cos\varphi$$

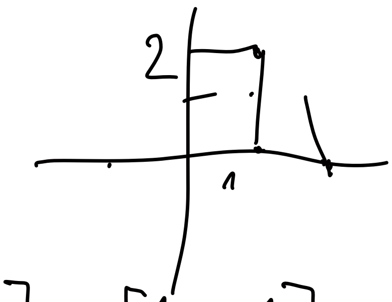
$$\frac{1}{\sqrt{2}} = \cos\varphi$$

$$\varphi = \frac{\pi}{2}$$



⑤ Nájdite parametrickú rovnicu priamky, ktorá prechádza

bodmi $A = [1,2]$
$B = [2,1]$



$\vec{u} = B - A = [2,1] - [1,2] = [1,-1]$

$X = [1,2] + k[1,-1]$

$x = 1 + k$ $\quad$ $k = 0 \rightarrow A$
$y = 2 - k$ $\quad$ $k = 1 \rightarrow B$

(kresliť, obrázok, pohyb)

⑥ Nájdite všeobecnú rovnicu priamky z predošlého príkladu

Normálový vektor

$\vec{n} = [a, b]$

$\vec{u} \perp \vec{n}$

$ax + by + c = 0$

$[1, 1]$

$\vec{u} = [-b, a]$

$= [1, 1]$

$x + y + c = 0$

$1 + 2 + c = 0$

$x + y - 3 = 0$

$2x + 2y - 6 = 0$ iné riešenie