# FVLA: 1.1: Algebra for n-tupler

3)c) VIS: $(\vec{x}+\vec{y})\cdot(\vec{x}-\vec{y}) = \vec{x}\cdot\vec{x} - \vec{y}\cdot\vec{y}$:

$$(\vec{x}+\vec{y})\cdot\underbrace{(\vec{x}-\vec{y})}_{\vec{z}} = \vec{x}\cdot\vec{z} + \vec{y}\cdot\vec{z} = \vec{x}\cdot(\vec{x}-\vec{y}) + \vec{y}\cdot(\vec{x}-\vec{y})$$

$\vec{z} := \vec{x}-\vec{y}$

Set. 1.1.1e

$$= \vec{x}\cdot\vec{x} - \vec{x}\cdot\vec{y} + \vec{y}\cdot\vec{x} - \vec{y}\cdot\vec{y}$$

Set. 1.1.1e

$$= \vec{x}\cdot\vec{x} - \cancel{\vec{x}\cdot\vec{y}} + \cancel{\vec{x}\cdot\vec{y}} - \vec{y}\cdot\vec{y}$$

Set. 1.1.1b

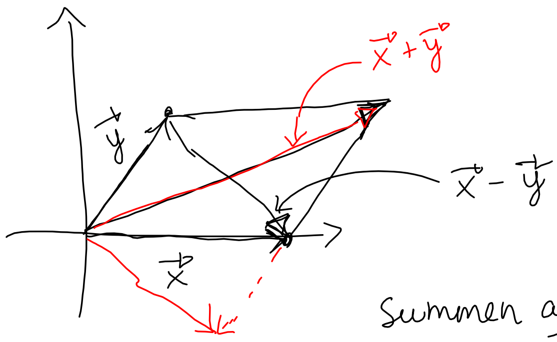
$$= \vec{x}\cdot\vec{x} - \vec{y}\cdot\vec{y}$$

$$\vec{x}\cdot(\vec{x}-\vec{y})$$
$$= \vec{x}\cdot(\vec{x}+\underbrace{(-\vec{y})}_{\vec{w}})$$
$$= \vec{x}\cdot(\vec{x}+\vec{w})$$
$$= \vec{x}\cdot\vec{x} + \vec{x}\cdot\vec{w} = \vec{x}\cdot\vec{x} + \vec{x}\cdot(-\vec{y})$$
$$= \vec{x}\cdot\vec{x} + (-\vec{x}\cdot\vec{y}) = \vec{x}\cdot\vec{x} - \vec{x}\cdot\vec{y}$$

## 1.2: Geometri for n-tupler

17.) VIS: $|\vec{x}+\vec{y}|^2 + |\vec{x}-\vec{y}|^2 = 2|\vec{x}|^2 + 2|\vec{y}|^2$

$$|\vec{x}+\vec{y}|^2 + |\vec{x}-\vec{y}|^2 = (\vec{x}+\vec{y})\cdot(\vec{x}+\vec{y}) + (\vec{x}-\vec{y})\cdot(\vec{x}-\vec{y})$$
$$= \vec{x}\cdot\vec{x} + \cancel{2\vec{x}\cdot\vec{y}} + \vec{y}\cdot\vec{y} + \vec{x}\cdot\vec{x} - \cancel{2\vec{x}\cdot\vec{y}} + \vec{y}\cdot\vec{y}$$
$$= 2\vec{x}\cdot\vec{x} + 2\vec{y}\cdot\vec{y} = 2|\vec{x}|^2 + 2|\vec{y}|^2$$




Summen av kvadratene av sidene:

$$|\vec{x}|^2 + |\vec{x}|^2 + |\vec{y}|^2 + |\vec{y}|^2$$
$$= 2|\vec{x}|^2 + 2|\vec{y}|^2$$

Sum kvadrat diagonalene:

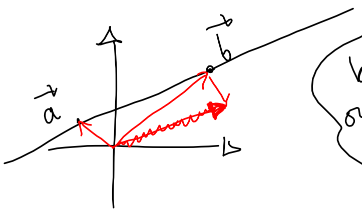
$$|\vec{x}-\vec{y}|^2 + |\vec{x}+\vec{y}|^2$$

Disse er like! Så påstanden er OK.

21.) $\vec{a} = (7,-3,2,4,-2)$, $\vec{b} = (2,1,-1,-1,5)$

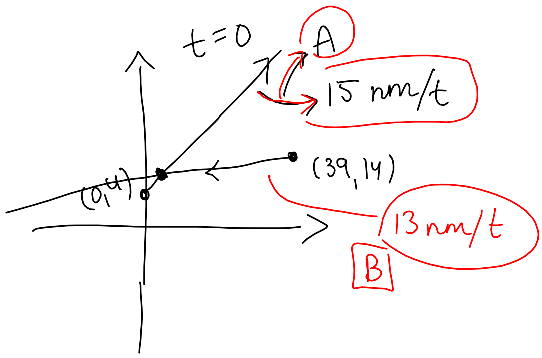
Retningsvektor: $\vec{b}-\vec{a} = (-5,4,-3,-5,7) := \vec{c}$

kunne også tatt $\vec{a}-\vec{b}$




$$\vec{r}(t) = \vec{a} + t\,\vec{c}$$
$$= (7-5t, -3+4t, 2-3t, 4-5t, -2+7t)$$

25.)




a) Parameterfremstillinger:

A: $\vec{r}_A(t) = (0,4) + t(3,4)$
$$= (3t, 4t+4)$$

B: $\vec{r}_B(t) = (39, 14) + t(-12, 5) = (39 - 12t, 14 + 5t)$

Kryss: $3t_1 = 39 - 12t_2$ , $4 + 4t_1 = 14 + 5t_2$

$$\Downarrow$$

$$t_1 = 13 - 4t_2 \Rightarrow 4 + 4(13 - 4t_2) = 14 + 5t_2$$

$$\Downarrow$$

$$\underline{t_1 = 5} \Leftarrow \underline{t_2 = 2}$$

Så parameterframstillingene krysser i $(3 \cdot 5, 4 + 4 \cdot 5) = \underline{\underline{(15, 24)}}$

( B: $(39 - 12 \cdot 2, 14 + 5 \cdot 2) = (39 - 24, 14 + 10)$
$= (15, 24)$ )

b) Kolliderer? Nei! Krysser kun én gang, i $(15, 24)$.

A må flytte seg: $\sqrt{(15-0)^2 + (24-4)^2} = \underline{25 \text{ nm}}$

B må flytte seg: $\sqrt{(39-15)^2 + (14-24)^2} = \underline{26 \text{ nm}}$

A bruker: $\dfrac{25 \text{ nm}}{15 \frac{\text{nm}}{t}} = \dfrac{5}{3}$ timer

B bruker: $\dfrac{26 \text{ nm}}{13 \frac{\text{nm}}{t}} = 2$ timer

Så, siden tiden A bruker $\neq$ tiden B bruker, vil skipene ikke kollidere.