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Opgave 007

$$\vec{a} = \begin{pmatrix} 3 \\ 5 \\ -2 \end{pmatrix}$$
$$\vec{b} = \begin{pmatrix} t \\ 7 \\ 1 \end{pmatrix}$$

Opgave A

$$t = 1$$

$$\vec{c} = \vec{a} \times \vec{b}$$
$$\vec{c} = \begin{pmatrix} 3 \\ 5 \\ -2 \end{pmatrix} \times \begin{pmatrix} 1 \\ 7 \\ 1 \end{pmatrix}$$
$$\vec{c} = \begin{pmatrix} y_a \cdot z_b - z_a \cdot y_b \\ z_a \cdot x_b - x_a \cdot z_b \\ x_a \cdot y_b - y_a - x_b \end{pmatrix}$$
$$\vec{c} = \begin{pmatrix} 5 \cdot 1 - (-2) \cdot 7 \\ (-2) \cdot 1 - 3 \cdot 1 \\ 3 \cdot 7 - 5 \cdot 1 \end{pmatrix}$$
$$\vec{c} = \begin{pmatrix} 19 \\ -5 \\ 16 \end{pmatrix}$$

Opgave B

$$t = 1$$

Bestem projektion af a på b

$$|\vec{b}| = \sqrt{x_b^2 + y_b^2 + z_b^2}$$
$$|\vec{b}| = \sqrt{1^2 + 7^2 + 1^2}$$
$$|\vec{b}| = 7{,}141428$$

$$|\overrightarrow{a_b}| = \frac{|\vec{a} \cdot \vec{b}|}{|\vec{b}|}$$
$$|\overrightarrow{a_b}| = \frac{|3 \cdot 1 + 5 \cdot 7 + (-2) \cdot 1|}{7.1414} \approx 5{,}041028$$

Opgave C

$$|\vec{a}| = \sqrt{x_a^2 + y_b^2 + z_a^2}$$
$$|\vec{a}| = \sqrt{3^2 + 5^2 + (-2)^2}$$

$$|\vec{a}| = 6{,}164414$$

$$A = 40$$
$$A = \left|\vec{a} \times \vec{b}\right| = |\vec{a}| \cdot \left|\vec{b}\right| \cdot \sin(v)$$

Opstil formel for længe af b

$$\left|\vec{b}\right| = \sqrt{t^2 + 7^2 + 1^2}$$
$$\left|\vec{b}\right| = \sqrt{t^2 + 50}$$

Vi skal opstille en formel for vinkel mellem a og b

$$v = \cos^{-1}\left(\frac{\vec{a} \cdot \vec{b}}{|\vec{a}| \cdot \left|\vec{b}\right|}\right)$$
$$v = \cos^{-1}\left(\frac{3 \cdot t + 5 \cdot 7 + (-2) \cdot 1}{6.16 \cdot \sqrt{t^2 + 50}}\right)$$
$$v = \cos^{-1}\left(\frac{3t + 33}{6.16 \cdot \sqrt{t^2 + 50}}\right)$$

Nu kan vi opstille formel for areal af paralellogram

$$A = 6.16 \cdot \sqrt{t^2 + 50} \cdot \sin\left(\cos^{-1}\left(\frac{3t + 33}{6.16 \cdot \sqrt{t^2 + 50}}\right)\right)$$

The equation is solved numerically for t by WordMat. With the following assumptions/definitions: $A = 40$

$$t \approx -2{,}828777 \quad \vee \quad t \approx 9{,}669195$$

Mulige løsninger

$$\vec{b}\begin{pmatrix} -2.83 \\ 7 \\ 1 \end{pmatrix} \; og \; \vec{b}\begin{pmatrix} 9.67 \\ 7 \\ 1 \end{pmatrix}$$