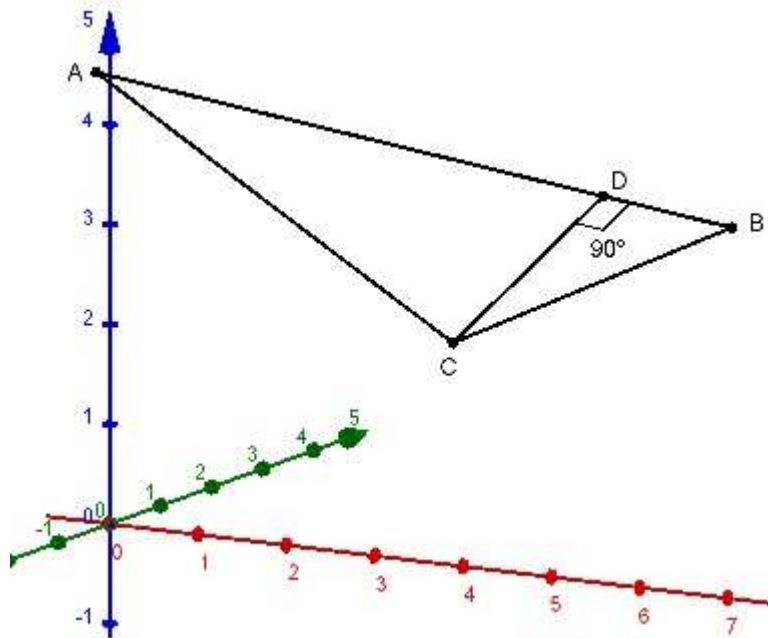


Analytische Geometrie Aufgabe 138

Berechnen Sie den Flächeninhalt A des Dreiecks ABC , wenn $A = (1|-2|5)$, $B = (3|7|2)$ und $C = (1|5|1)$.



$$A = \frac{|\overrightarrow{DC}| * |\overrightarrow{BA}|}{2}$$

$$\overrightarrow{CD} \perp \overrightarrow{BA} \rightarrow \overrightarrow{CD} * \overrightarrow{BA} = 0$$

$$\overrightarrow{BD} = r * \overrightarrow{BA}$$

$$\overrightarrow{CD} = \overrightarrow{BD} - \overrightarrow{BC}$$

$$(\overrightarrow{BD} - \overrightarrow{BC}) * \overrightarrow{BA} = 0$$

$$(r * \overrightarrow{BA} - \overrightarrow{BC}) * \overrightarrow{BA} = 0$$

$$\overrightarrow{BC} = \begin{pmatrix} 1 \\ 5 \\ 1 \end{pmatrix} - \begin{pmatrix} 3 \\ 7 \\ 2 \end{pmatrix} = \begin{pmatrix} -2 \\ -2 \\ -1 \end{pmatrix}$$

$$\overrightarrow{BA} = \begin{pmatrix} 1 \\ -2 \\ 5 \end{pmatrix} - \begin{pmatrix} 3 \\ 7 \\ 2 \end{pmatrix} = \begin{pmatrix} -2 \\ -9 \\ 3 \end{pmatrix}$$

$$\left[r * \begin{pmatrix} -2 \\ -9 \\ 3 \end{pmatrix} - \begin{pmatrix} -2 \\ -2 \\ -1 \end{pmatrix} \right] \cdot \begin{pmatrix} -2 \\ -9 \\ 3 \end{pmatrix} = 0$$

$$4r - 4 + 81r - 18 + 9r + 3 = 0$$

$$94r - 19 = 0 \quad | +19$$

$$94r = 19 \quad | :94$$

$$r = 0,202$$

$$\vec{OD} = \vec{OB} + r * \vec{BA}$$

$$\vec{OD} = \begin{pmatrix} 3 \\ 7 \\ 2 \end{pmatrix} + 0,202 * \begin{pmatrix} -2 \\ -9 \\ 3 \end{pmatrix} = \begin{pmatrix} 2,6 \\ 5,18 \\ 2,606 \end{pmatrix}$$

$$\vec{DC} = \begin{pmatrix} 1 \\ 5 \\ 1 \end{pmatrix} - \begin{pmatrix} 2,6 \\ 5,18 \\ 2,606 \end{pmatrix} = \begin{pmatrix} -1,6 \\ -0,18 \\ -1,606 \end{pmatrix}$$

$$|\vec{DC}| = \sqrt{(-1,6)^2 + (-0,18)^2 + (-1,606)^2} = \sqrt{5,17} = 2,27$$

$$|\vec{BA}| = \sqrt{(-2)^2 + (-9)^2 + 3^2} = \sqrt{94} = 9,695$$

$$\mathbf{A} = \frac{2,27 * 9,695}{2} = \mathbf{11 \text{ FE}}$$