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Opgave 501

$$h = 5$$

$$s = 3$$

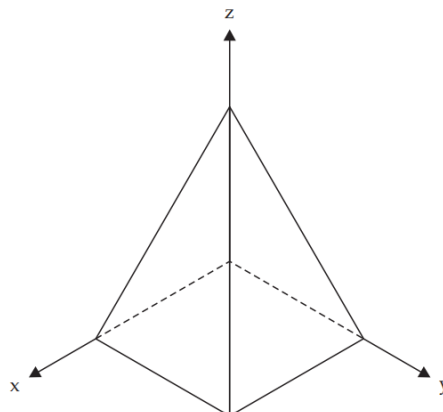
Vi finder vektorer som ligger langs siderne

$$\vec{V}_1 = \begin{pmatrix} s \div 2 \\ s \div 2 \\ h \end{pmatrix} = \begin{pmatrix} 1.5 \\ 1.5 \\ 5 \end{pmatrix}$$

$$\vec{V}_2 = \begin{pmatrix} s \div 2 \\ -s \div 2 \\ h \end{pmatrix} = \begin{pmatrix} 1.5 \\ -1.5 \\ 5 \end{pmatrix}$$

$$\vec{V}_3 = \begin{pmatrix} -s \div 2 \\ s \div 2 \\ h \end{pmatrix} = \begin{pmatrix} -1.5 \\ 1.5 \\ 5 \end{pmatrix}$$

$$\vec{V}_4 = \begin{pmatrix} -s \div 2 \\ -s \div 2 \\ h \end{pmatrix} = \begin{pmatrix} -1.5 \\ -1.5 \\ 5 \end{pmatrix}$$



Vinkel mellem modstående sider

$$\begin{aligned} \vec{n}_1 &= \vec{V}_2 \times \vec{V}_1 \\ \vec{n}_1 &= \begin{pmatrix} 1.5 \\ -1.5 \\ 5 \end{pmatrix} \times \begin{pmatrix} 1.5 \\ 1.5 \\ 5 \end{pmatrix} = \begin{pmatrix} -15 \\ 0 \\ 4.5 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} \vec{n}_2 &= \vec{V}_3 \times \vec{V}_4 \\ \vec{n}_2 &= \begin{pmatrix} -1.5 \\ 1.5 \\ 5 \end{pmatrix} \times \begin{pmatrix} -1.5 \\ -1.5 \\ 5 \end{pmatrix} = \begin{pmatrix} 15 \\ 0 \\ 4.5 \end{pmatrix} \end{aligned}$$

Formel for vinkel mellem vektorer

$$v = \cos^{-1} \left(\frac{x_1 \cdot x_2 + y_1 \cdot y_2 + z_1 \cdot z_2}{\sqrt{x_1^2 + y_1^2 + z_1^2} \cdot \sqrt{x_2^2 + y_2^2 + z_2^2}} \right)$$

$$v_{\text{modstående}} = \cos^{-1} \left(\frac{(-15) \cdot 15 + 0 \cdot 0 + 4.5 \cdot 4.5}{\sqrt{(-15)^2 + 0^2 + 4.5^2} \cdot \sqrt{15^2 + 0^2 + 4.5^2}} \right) \approx 146,6015$$

Nu skal vi finde vinkel mellem de hosliggende sider

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$$\vec{n}_3 = \vec{V}_4 \times \vec{V}_2$$

$$\vec{n}_3 = \begin{pmatrix} -1.5 \\ -1.5 \\ 5 \end{pmatrix} \times \begin{pmatrix} 1.5 \\ -1.5 \\ 5 \end{pmatrix} = \begin{pmatrix} 0 \\ 15 \\ 4.5 \end{pmatrix}$$

$$v_{\text{hosliggende}} = \cos^{-1} \left(\frac{\vec{n}_1 \cdot \vec{n}_3}{|\vec{n}_1| \cdot |\vec{n}_3|} \right)$$

$$v_{\text{hosliggende}} = \cos^{-1} \left(\frac{(-15) \cdot 0 + 0 \cdot 15 + 4.5 \cdot 4.5}{\sqrt{(-15)^2 + 0^2 + 4.5^2} \cdot \sqrt{0^2 + 15^2 + 4.5^2}} \right) \approx 85,26376$$