

Answer on Question #45083 – Math – Analytic Geometry

Question

Find the angle between the lines $x=1, z-y=0$ and $2x-y=-1, z=1$.

Solution

The equation of the first line could be rewritten as $\frac{x-1}{0} = \frac{y}{1} = \frac{z}{1}$, and the equation of the second line could be rewritten as $\frac{x+\frac{1}{2}}{\frac{1}{2}} = \frac{y}{1} = \frac{z-1}{0}$. Hence the direction vector of the first line is $(0,1,1)$ and the direction vector of the second line is $(\frac{1}{2}, 1, 0)$. The angle between lines equals the angle

between direction vectors, hence $\cos \alpha = \frac{0 \cdot \frac{1}{2} + 1 \cdot 1 + 1 \cdot 0}{\sqrt{0^2 + 1^2 + 1^2} \sqrt{(\frac{1}{2})^2 + 1^2 + 0^2}} = \frac{1}{\sqrt{2} \cdot \sqrt{\frac{1}{4} + 1}} = \sqrt{\frac{2}{5}}$, $\alpha = \arccos \sqrt{\frac{2}{5}}$

(approximately 51°).

Answer: $\alpha = \arccos \sqrt{\frac{2}{5}}$.