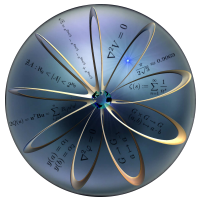

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example of rotation matrix

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You can use rotation matrices to show that if the slope of one line is m, then the slope of the line perpendicular to it is $\frac{-1}{m}$:

Let L be a line with a slope of m passing through the origin. The rotation matrix $R_{\frac{\pi}{2}}$ rotates L into a line L' perpendicular to L:

$$R_{\pi/2} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

Every point on L can be represented as a multiple of the point $\vec{p} = \begin{pmatrix} 1 \\ m \end{pmatrix}$.

Notice $\vec{p}' = R_{\frac{\pi}{2}}\vec{p} = \begin{pmatrix} -m \\ 1 \end{pmatrix}$. Since every point on L' can be represented as a multiple of the point $\vec{p}'$, the slope of L' is $\frac{-1}{m}$.