Step-1

Let $x=(x_1,x_2), y=(y_1,y_2)$ are the vectors

Two vectors are perpendicular when the product of their slopes is -1

That is, $\left(\frac{x_2}{x_1}\right)\left(\frac{y_2}{y_1}\right)=-1$ by hypothesis

$\Rightarrow x_2y_2=-x_1y_1$

$\Rightarrow x_2y_2+x_1y_1=0$

This is equivalent to $\begin{pmatrix}x_1 & x_2\end{pmatrix}\begin{pmatrix}y_1\\y_2\end{pmatrix}=0$

Therefore, $x^Ty=0$