Step-1

If P is any permutation matrix, we have to find a nonzero matrix x such that $(I-P)x=0$

Given that $(I-P)x=0$

$\Rightarrow Ix-Px=0$
$\Rightarrow Ix=Px$
$\Rightarrow x=Px$

Since by matrices multiplication and because I is identity so $Ix=x$

This will happens if $x=(1,1,...,1)$

Step-2

Because for instance let $x=(1,1,1)$ and P be 3 by 3 permutation matrix equals to I then

$$Px=\begin{pmatrix}1&0&0\\0&1&0\\0&0&1\end{pmatrix}\begin{pmatrix}1\\1\\1\end{pmatrix}$$
$$=\begin{pmatrix}1\\1\\1\end{pmatrix}$$
$$=x$$