

Solution (#913) (ii) The null space of $T_{\mathbf{a}}$ is $\langle \mathbf{a} \rangle$. The column space of $T_{\mathbf{a}}$ is the plane $\mathbf{r} \cdot \mathbf{a} = 0$.

(iii) Say $\mathbf{a} = (a_1, a_2, a_3)$. Then the associated matrix of $T_{\mathbf{a}}$ is

$$\begin{pmatrix} 0 & -a_3 & a_2 \\ a_3 & 0 & -a_1 \\ -a_2 & a_1 & 0 \end{pmatrix}.$$