Special Problem A-1

The components of a symmetric tensor $\boldsymbol{\tau}$ are

$$\begin{array}{ccc} \tau_{xx} = 3 & \tau_{xy} = 2 & \tau_{xz} = -1 \\ \tau_{yx} = 2 & \tau_{yy} = 2 & \tau_{yz} = 1 \\ \tau_{zx} = -1 & \tau_{zy} = 1 & \tau_{zz} = 4 \end{array}$$

The components of a vector $\boldsymbol{v}$ are

$$v_x = 5 \quad v_y = 3 \quad v_z = -2$$

Evaluate

(a) $\boldsymbol{\tau} \cdot \boldsymbol{v}$

(b) $\boldsymbol{v} \cdot \boldsymbol{\tau}$

(c) $\boldsymbol{\tau} : \boldsymbol{\tau}$

(d) $\boldsymbol{v} \cdot (\boldsymbol{\tau} \cdot \boldsymbol{v})$

(e) $\boldsymbol{v}\boldsymbol{v}$

(f) $\boldsymbol{\tau} \cdot \boldsymbol{e}_x$