50. (a) From Eq. 23-38 (and the facts that $\hat{\mathrm{i}} \cdot \hat{\mathrm{i}} = 1$ and $\hat{\mathrm{j}} \cdot \hat{\mathrm{i}} = 0$), the potential energy is

$$\begin{aligned} U &= -\vec{p} \cdot \vec{E} = -[(3.00\hat{\mathrm{i}} + 4.00\hat{\mathrm{j}})(1.24 \times 10^{-30}\,\mathrm{C{\cdot}m})] \cdot [(4000\,\mathrm{N/C})\hat{\mathrm{i}}] \\ &= -1.49 \times 10^{-26}\ \mathrm{J}\ . \end{aligned}$$

(b) From Eq. 23-34 (and the facts that $\hat{\mathrm{i}} \times \hat{\mathrm{i}} = 0$ and $\hat{\mathrm{j}} \times \hat{\mathrm{i}} = -\hat{\mathrm{k}}$), the torque is

$$\begin{aligned} \vec{\tau} &= \vec{p} \times \vec{E} = [(3.00\hat{\mathrm{i}} + 4.00\hat{\mathrm{j}})(1.24 \times 10^{-30}\,\mathrm{C{\cdot}m})] \times [(4000\,\mathrm{N/C})\hat{\mathrm{i}}] \\ &= (-1.98 \times 10^{-26}\,\mathrm{N{\cdot}m})\hat{\mathrm{k}}\ . \end{aligned}$$

(c) The work done is

$$\begin{aligned} W &= \Delta U = \Delta(-\vec{p} \cdot \vec{E}) = (\vec{p}_i - \vec{p}_f) \cdot \vec{E} \\ &= [(3.00\hat{\mathrm{i}} + 4.00\hat{\mathrm{j}}) - (-4.00\hat{\mathrm{i}} + 3.00\hat{\mathrm{j}})](1.24 \times 10^{-30}\,\mathrm{C{\cdot}m})] \cdot [(4000\,\mathrm{N/C})\hat{\mathrm{i}}] \\ &= 3.47 \times 10^{-26}\ \mathrm{J}\ . \end{aligned}$$