34. (a) Eq. 39-11 yields

$$\Delta\lambda = \frac{h}{m_e c}(1 - \cos\phi) = (2.43\,\text{pm})(1 - \cos 180^\circ) = +4.86\ \text{pm}\ .$$

(b) Using the result of problem 3, the change in photon energy is

$$\Delta E = \frac{hc}{\lambda'} - \frac{hc}{\lambda} = (1240\,\text{eV}\cdot\text{nm})\left(\frac{1}{0.01\,\text{nm} + 4.86\,\text{pm}} - \frac{1}{0.01\,\text{nm}}\right) = -41\ \text{keV}\ .$$

(c) From conservation of energy, $\Delta K = -\Delta E = 41\,\text{keV}$.

(d) The electron will move straight ahead after the collision, since it has acquired some of the forward linear momentum from the photon.