TL 3-39 Compton scattering

$\lambda_{photon} = 0.0711\,nm$

a) $E_{photon} = \frac{hc}{\lambda} = 2.794 \times 10^{-15}\ J$ exactly

$= \boxed{17.44\ keV}$

b) The x-rays scattered at $\theta = 180°$ are given by

$\Delta\lambda = \frac{h}{m_0 c}(1-\cos\theta) = \lambda_c(1-\cos\theta)$

$= (0.00243\,nm)(1-\cos 180°)$

$\Delta\lambda = 0.00486\,nm$

So $\lambda_{scat} = \boxed{0.0760\,nm}$

c) $E_{scattered} = \frac{hc}{\lambda} = 2.614 \times 10^{-15}\ J$

$= \boxed{16.31\ keV}$

d) The electron, if scattered elastically, has energy

$E_{electron} = \boxed{1.13\ keV}$

$= 1.8 \times 10^{-16}\ J$