(12.1) (a) What is the most probable kinetic energy of a hydrogen atom at the interior of the sun (T=1.5*10^7 K)? (b) What fraction of the particles would have energies in excess of 100 keV?

$T_{sun} := 1.5 \cdot 10^{7} \cdot K$ $k := 1.38066 \cdot 10^{-23} \cdot joule \cdot K^{-1}$ $eV := 1.6021773 \cdot 10^{-19} \cdot joule$

(a) $E_{kin} := \frac{3 \cdot k \cdot T_{sun}}{2}$ $E_{kin} = 3.106 \cdot 10^{-16} \cdot joule$ $E_{kin} = 1.939 \cdot 10^{3} \cdot eV$

(b) 1000 times the lower limit is enough to neglect the value above that limit (the integrated function becomes practically zero).

$E_{100} := 100 \cdot 10^{3} \cdot eV$ $E_{hi} := 1000 \cdot E_{100}$

$$x_{above} := \int_{E_{100}}^{E_{hi}} \sqrt{E} \cdot \exp\left(-\frac{E}{k \cdot T_{sun}}\right) \cdot \left[\left(\frac{2}{\sqrt{\pi}}\right) \cdot \left(k \cdot T_{sun}\right)^{-\frac{3}{2}}\right] dE \qquad x_{above} = 1.842 \cdot 10^{-30}$$