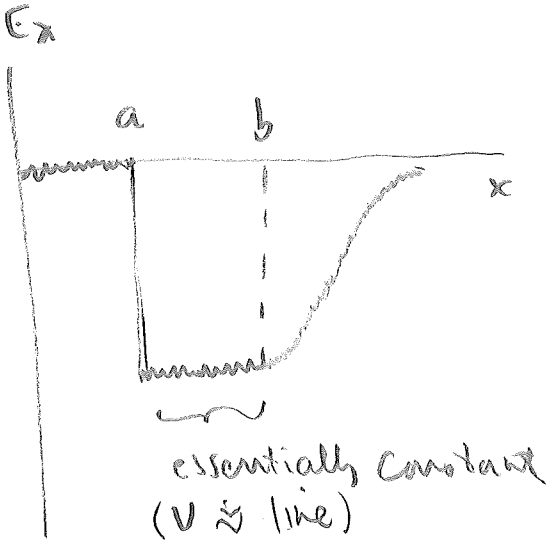
23.52 $E_x = -\frac{dV}{dx}$




23.87 a) Volume of each daughter is $\frac{1}{2}V_i$; $V = \frac{4}{3}\pi r^3$

$$2 \cdot \tfrac{4}{3}\pi r_d^3 = \tfrac{4}{3}\pi r_0^3 \qquad r_d = \frac{r_0}{\sqrt[3]{2}} = 0.794 \times 7.4\times10^{-15}\ m = 5.9\times10^{-15}\ m.$$

b) $U_i = K_f = 2K_{df}$ $\quad K_{df} = \frac{1}{2}\cdot\frac{1}{4\pi\varepsilon_0}\cdot\frac{46^2\cdot(1.6\times10^{-19}C)^2}{2\cdot 5.9\times10^{-15}\ m} = 2.07\times10^{-11}\ J.$

c) $10\ kg \times \frac{1}{236u\cdot 1.66\times10^{-27}\frac{kg}{u}} = 2.55\times10^{25}$ atoms.

Energy released $= \frac{1}{2}\cdot 2.07\times10^{-11}\ J \cdot 2.55\times10^{25} = 1.06\times10^{15}\ J.$

$= 252.5$ kilotons TNT.

d) "Nuclear energy" in the atomic bomb (but not the thermonuclear hydrogen bomb!) is stored electrical potential energy!