2) ověřte přímým výpočtem pro 1atomový plyn $c_v = \frac{1}{kT^2}(\sigma E)^2$

$$c_v = \left(\frac{\partial E}{\partial T}\right)_V = \left| E = \frac{3}{2}kT \right| = \underline{\underline{\frac{3}{2}k}}$$

$$c_v = \frac{1}{kT^2}(\sigma E)^2 = \frac{1}{kT^2}\left(\langle E^2\rangle - \langle E\rangle^2\right) = \frac{1}{kT^2}\left(\langle E^2\rangle - \frac{9}{4}k^2T^2\right)$$

$$\langle E^2\rangle = \sum_n^N E_n^2 w_n = \sum_n E_n^2 \frac{1}{Z} e^{-\frac{E_n}{kT}} = \sum E_n^2 \frac{e^{-\frac{E_n}{kT}}}{\sum e^{-\frac{E_n}{kT}}} = \left| E_n = \frac{3}{2}kT \right| =$$

$$= \frac{9}{4}k^2T^2 \cdot \underbrace{\sum_n^N \frac{e^{-\frac{3}{2}}}{\sum_n^N e^{-\frac{3}{2}}}}_{1} = \frac{9}{4}k^2T^2 \Rightarrow c_v = 0$$

muselo by platit $\langle E^2\rangle = \frac{15}{4}k^2T^2$ ale nevím jak na to dojít