

Problem 4.

By isochoric we mean $\Delta V = 0$ ($V = \text{const}$). Imagine a rigid box with gas sealed that you cannot compress or expand, you just heat it.

The first law of Thermo says $\Delta E = Q + R$ which becomes

$$Q = E_2 - E_1$$

since $R = 0$. In other words, all the heat you add goes straight into internal energy. With $E = Nc_v T$:

$$Q = Nc_v (T_2 - T_1)$$