NAME :

Quiz 1

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Suppose that there is a gaseous system where the internal energy is related to pressure and volume by

$$U = 2.5PV + k, \tag{1}$$

where k is some constant. The system is taken through the cycle of processes shown in Figure (1).

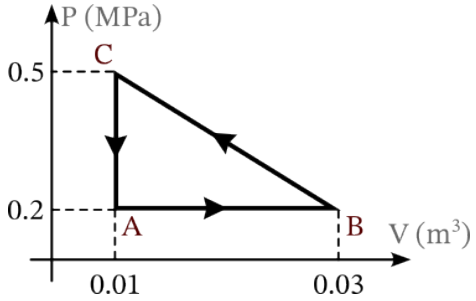

Figure 1: A thermodynamic system is taken along a process $A \to B \to C \to A$. Note that 1MPa = 10^6 Pa.

(a) Assuming A to be the "fiducial" state, find the value of k. Also find U_B and U_C. [2]

(b) Compute the work done along each of the arms AB, BC, and CA. [3]

Hint: You don't need to compute any integrals if you know how integrals are related to areas.

(c) Find the heat transfer in each case, clearly indicating if the heat flows into or out of the system. [3]

(d) To check your answer, compute the total work done and the total heat transferred during the full cycle. Explain whether (or not!) your answer makes sense. [2]