NAME :

Quiz 5

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(a) Argue that for an adiabatic process

$$\mathrm{d}U = -P\mathrm{d}V. \tag{1}$$

Now, suppose you are given that for a specific system $U = (5/2)PV$. Show that the adiabats satisfy

$$PV^{\gamma} = \text{constant}, \tag{2}$$

where γ is a constant you have to find for this system. [4]

(b) If the earlier the system were an ideal gas following $PV = Nk_BT$, starting at some (P_A, V_A), compute the work done in doubling the volume by performing (i) an isothermal expansion, and (ii) an adiabatic expansion.

Explain *graphically* using a PV diagram which of these two must always be greater. [6]