3. A sample containing three moles of an ideal gas is taken through a series of equilibrium states, as represented by the closed path ABCDA in the diagram above.

(a)

    i. Rank the temperatures at the 4 labeled points from least to greatest, using 1 for the lowest temperature. If two or more points have the same temperature, give them the same ranking.
        _____ A _____ B _____ C _____ D

    ii. Determine the temperature T_D at point D in terms of P_0 , V_0, and fundamental constants, as appropriate.

(b) Indicate all segments of the path ABCDA, if any, for which the work done by the gas is positive. If the work done by the gas is not positive for any of the segments, then check None.
    _____ AB _____ BC _____ CD _____ DA _____ None
Justify your answer.

(c) In process AB, is the energy transferred to the gas by heating positive, negative, or zero? _____
Positive _____ Negative _____ Zero Justify your answer.

(d) Derive an expression for the net work done on the gas during the entire process ABCDA. Express your answer in terms of P_0 , V_0, and fundamental constants, as appropriate.