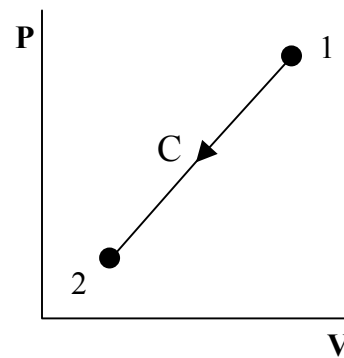
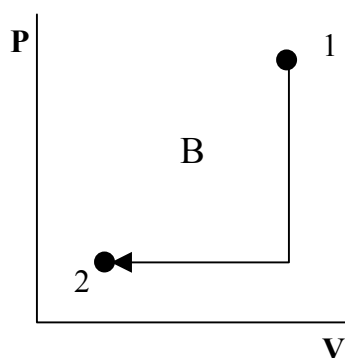
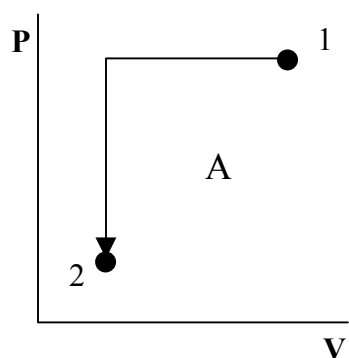


- 1) Consider a gas at state 1 as defined on the P-V coordinate. Three processes are being considered to bring it to state 2.



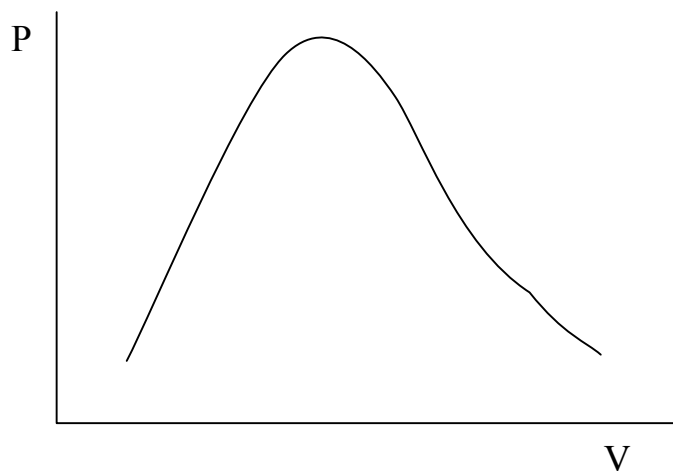
In all three cases, there is a net work being done _____ the system. Therefore the sign of W is _____

Rank the amount of **work** in increasing order (e.g. A, B, C): _____
(hint. is there a graphical way to represent work?)

Which process has the largest change in **internal energy**? _____

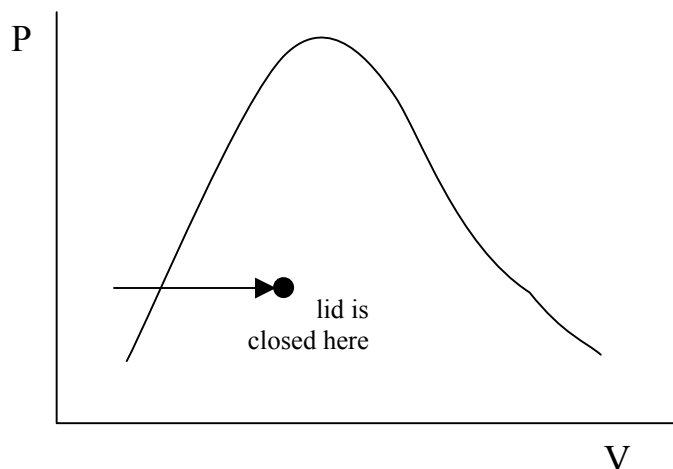
(go to next page first)

3)



i) Label the diagram: phases and critical point.

ii) Consider liquid water in an open pot. The pot is on a stove, which is turned on. Draw the path followed by the water



(To think about later):

What if once the water is boiling, the pot is closed and sealed with a lid? What path will it follow now?

- 2) Let us suspend disbelief for a while and imagine being in the middle of a hot midsummer night. You are inside an apartment and the temperature is 35°C (95°F). Alas! the air conditioner is broken. Your neighbor, R. Goodfellow, stops by and suggests cooling down the room by placing a refrigerator in the room and keeping the doors wide open. He also offers to rent you his small 250-watt refrigerator for a low rate of \$0.10/hr. But you are also considering buying a used AC; you saw an ad offering one for \$100.
- i) What would you do? Or do you need more information?
- ii) Suppose you go ahead with the refrigerator plan. We want to estimate the change of temperature in the room after you open the refrigerator for 30 minutes. For simplicity, we make the assumptions stated below. Approximate the apartment to be 8 meters by 5 meters by 3 meters. The room is at 1 atm to start with.
- Assume: a) the room is closed and perfectly insulated b) only T_{air} changes (no need to cool/heat walls)
 c) air is ideal gas with $C_v = 2.5 R$ d) air inside room has the same T everywhere