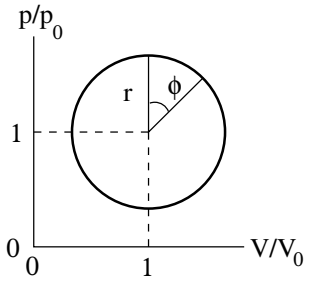
[tex147] Circular heat engine I

Consider 1 mol of a classical ideal gas [$pV = RT$] confined to a cylinder by a piston. The cylinder is in thermal contact with a heat bath of adjustable temperature. As the piston moves back and forth between volume $V = V_0(1-r)$ and $V = V_0(1+r)$ quasistatically, the temperature of the gas is being adjusted via thermal contact such that the cycle becomes circular in the (V, p)-plane and proceeds in clockwise direction (ϕ from 0 to 2π).
(a) Calculate the net work output ΔW_{out} during one cycle.
(b) Set $r = 0.5$ and identify the segments along the circle where the temperature of the gas rises and the segments where it falls.
(c) Repeat the previous part for $r = 0.9$. Note that there now are more segments.



Solution: