[tex24] Carnot cycle of thermal radiation

Describe the four steps of a Carnot engine, where the operating material is black-body radiation. The internal energy is given by Stefan's law, $U(T,V) = \sigma T^4 V$. The equation of state is $p = \frac{1}{3}\sigma T^4$. Determine the work performance ΔW and the heat transfer ΔQ during each of the four steps and derive the Carnot efficiency from these results. Sketch the cycle in the (V, p)-plane.

Solution: