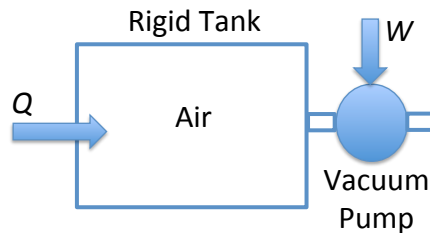

Thermodynamics - 1

The rigid tank shown in the figure below has a total capacity of 180 ft^3 and is initially filled with air at 1 atm and $70 \text{ }^\circ\text{F}$. A vacuum pump evacuates the air from the tank, while sufficient energy via a heat interaction is transferred to the air to maintain its temperature at $70 \text{ }^\circ\text{F}$. The pump discharges the contents of the tank to the surroundings, which are at 1 atm and $70 \text{ }^\circ\text{F}$. **factor 1 Btu/778.16 ft lbf**



- What is the minimum work in Btu required to evacuate the air from the tank? **(80 points)**
- What is the heat transfer in Btu required to maintain the temperature of the air constant throughout this process when only the minimum work is required? **(20 points)**