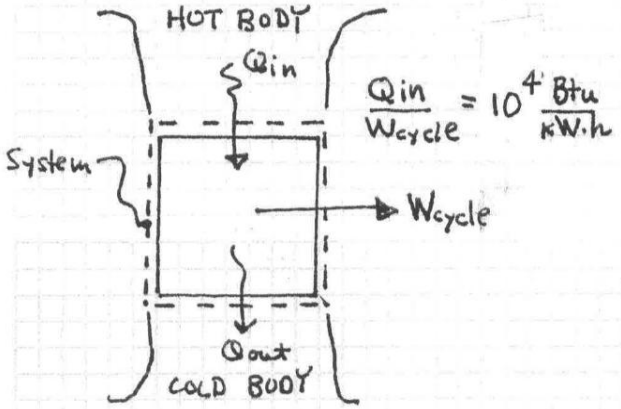
PROBLEM 2.84

KNOWN: Operating data are provided for a system undergoing a power cycle.

FIND: Determine the thermal efficiency.

SCHEMATIC & GIVEN DATA:



$\frac{Q_{in}}{W_{cycle}} = 10^4 \frac{Btu}{kW \cdot h}$

ENGINEERING MODEL:

1. The system undergoes a power cycle.
2. Energy transfers are positive in the direction of arrows on the schematic.

ANALYSIS: The thermal efficiency is $\eta = \frac{W_{cycle}}{Q_{in}}$.

With given data,

(See unit conversions: 1W = 3.413 Btu/h)

$$\eta = \left[\frac{1}{10^4 \frac{Btu}{kW \cdot h}}\right] \left| \frac{3413\ Btu}{1\ kW \cdot h} \right| = 0.3413 \quad (34.13\%)$$