General solution steps (open systems)

- Sketch the system
  - Identify boundary
  - Identify inlet/exit channels/flows
  - Label channels & its property values
  - Make sure 2 properties are known at each channel (State postulate)
  - If needed, sketch property diagram & processes involved (p-v, T-v)
- Begin with the general SSSF energy equation

$$\dot{Q} - \dot{W} = \sum_{out} \dot{m}(h + ke + pe) - \sum_{in} \dot{m}(h + ke + pe)$$

- Simplify with relevant assumptions
- Determine property values needed

$$\dot{m} = \rho \vec{V} A = \frac{\vec{V} A}{v}$$
$$= \rho \dot{V} = \frac{\dot{V}}{v}$$

- $H_2O \rightarrow$ steam table
- gas $\rightarrow$ $pv = RT$ $\quad p\dot{V} = \dot{m}RT$
  $h = c_P T$ $\quad u = c_V T$
  $\gamma = \frac{c_P}{c_V}$ $\quad R = c_P - c_V$

- Solve the problem…