Homework: #6

3.53

$$\frac{dE}{dt} = \dot{m}_1(u_1 + Pe_1 + Ke_1 + P_1v_1) + \dot{w} + \dot{Q} - \dot{m}_2(u_2 + Pe_2 + Ke_2 + P_2v_2)$$

$$\Delta u = Pe_1 + Ke_1 + P_1v_1 + \dot{w} + \dot{Q} - Pe_2 - Ke_2 - P_2v_2$$

$$= \frac{9.8*45}{1000} + \frac{\frac{1}{2}(50^2 - 150^2)}{1000} + (300*3 - 60*9) - 70 - 3$$

$$= 277.4 \text{ kJ/kg}$$

3.55

~~$\frac{dE}{dt} = 0$~~ $\Delta h = h_2 - h_1 = ke_1 - ke_2$

$$= \frac{V_1^2 - V_2^2}{2g_c}$$

$$= \frac{500^2 - 4000^2}{2*32.2}$$

$$= -2.45\times10^5 \text{ lbf}\cdot\text{ft/lbm}$$

$$= -2.45\times10^5 \cdot \frac{\text{lbf}\cdot\text{ft}}{\text{lbm}} \cdot \frac{1\text{B}}{778\cdot\text{lbf}\cdot\text{ft}}$$

$$= -314 \frac{\text{B}}{\text{lbm}}$$