In its most general form, the accounting principle for any extensive property of a system can be expressed as

\[ \frac{dB_{sys}}{dt} = \dot{B}_{in} - \dot{B}_{out} + \dot{B}_{gen} - \dot{B}_{con} \]  
Equation (1)

a) When we apply it to count the mass of a system, how does Equation (1) simplify to? (4 points)

\[ \frac{dm_{sys}}{dt} = \dot{m}_{in} - \dot{m}_{out} \]  
Equation (2)

b) How does Equation (2) simplify to if it is applied to a steady state system? (Don’t just give the results. Please show your logic!) (3 points)

\[ \frac{dm_{sys}}{dt} = 0 \Rightarrow \dot{m}_{in} = \dot{m}_{out} \]

c) How does Equation (2) simplify to if it is applied to a closed system? (Don’t just give the results. Please show your logic!) (3 points)

\[ \dot{m}_{in} = \dot{m}_{out} = 0 \Rightarrow \frac{dm_{sys}}{dt} = 0 \]