1.)   a.) Establish initial variables:

$$V_0 = 100, Q_0 = 0, f_{in} = f_{out} = 2, c_{in} = 0.5$$

Setup equation for salt concentration:

$$\frac{dQ}{dt} = f_{in}c_{in} - f_{out}c_{out} = 1 - \frac{Q}{100} \implies \frac{dQ}{dt} + \frac{Q}{100} = 1$$

Solving for Q:

$$Q =$$