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We look at a sufficiently small time interval $[t, t+\Delta t]$

$\Delta x, \Delta y$ = the change of amount of salt in Tank A and Tank B, respectively, in $[t, t+\Delta t]$

$20\Delta t$ = the amount of solution flowing into Tank A & B, respectively, in $[t, t+\Delta t]$

$\frac{x(t)}{200}, \frac{y(t)}{300}$ = density of salt in Tank A & B, respectively, at time t (or approximately in $[t, t+\Delta t]$)

$$\Delta x = \underbrace{-20\Delta t \frac{x}{200}}_{\text{flow out}} + \underbrace{20\Delta t \frac{y}{300}}_{\text{flow in}}$$

↓ divided by Δt

$$\frac{\Delta x}{\Delta t} = -\frac{1}{10}x + \frac{1}{15}y \qquad \text{let } \Delta t \to 0$$

$$x' = -\frac{1}{10}x + \frac{1}{15}y$$

Similarly, we can derive

$$y' = \frac{1}{10}x - \frac{1}{15}y$$