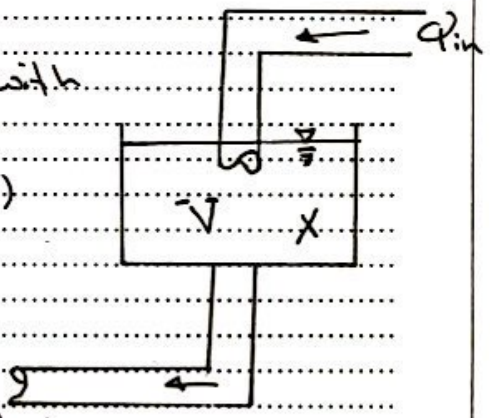
Engineering Analysis & Numerical Methods

Applications

X = amount of salt in tank at any time (t).



$\frac{dX}{dt}$ = rate of X changing with time.

$\frac{dX}{dt}$ = rate (in) - rate (out)

$\frac{gm}{min} = \frac{lit}{min} \times \frac{gm}{lit}$

$$\frac{dX}{dt} = Q_{in} * C_{in} - Q_{out} * C_{out}$$

Notes:-

i- 1 gm = 3.785 lit.

$1\ m^3 = 1000$ lit.

ii- in case of $Q_{in} = Q_{out} \Rightarrow dV = 0$

$\therefore V$ = constant

Example :- A tank is initially filled with 100 gal of salt solution containing 1 (lb/gal). Fresh brine at 2 (lb/gal) of salt runs into the tank is kept practically uniform and runs out the tank at the same rate. Find the amount of salt in the tank at any time?