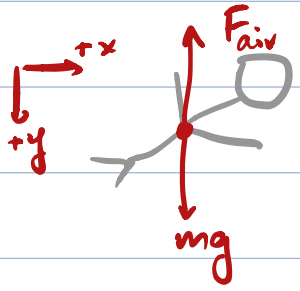
Ayush Gaggar | **Assignment 1: Skydiving Simulation** 10/8

a) Given: $m = 74.8\,kg$, $c = 13.3\ kg/s$, $\Delta t = 3s$, $v(t=0s) = 0$



$$\Sigma F_y = ma = mg - F_{air}, \quad F_{air} = cv$$

$$\frac{dv}{dt} = g - \frac{cv}{m}; \quad \frac{dv}{dt} \approx \frac{v(t_{i+1}) - v(t_i)}{t_{i+1} - t_i}$$

$$v(t_{i+1}) = (t_{i+1} - t_i)\left(g - \frac{cv(t_i)}{m}\right) + v(t_i)$$

$$v(t_{i+1}) = (3\,s)\left(9.81\tfrac{m}{s^2} - \left(\tfrac{13.3}{74.8}\tfrac{1}{s}\right)(v(t_i))\right) + v(t_i)$$

$v(0) = 0\ m/s$

$v(3s) = 3(9.81 - 0.178(0)) + 0 = 29.43\tfrac{m}{s}$

$v(6s) = 3(9.81 - 0.178(29.43)) + 29.43 = 43.16\tfrac{m}{s}$

$v(9s) = 3(9.81 - 0.178(43.16)) + 43.16 = 49.57\ m/s$

$v(9s) = 49.57\ m/s$