Para el problema del paracaidista se tiene que

$$\frac{dV}{dt} = g - \frac{c}{m}\left(V + a\left(\frac{V}{V_{max}}\right)^b\right)$$

Calcular $v(t)$ usando el metodo de euler y el R-K de 2do y 4to orden. Con $h = 0.1$ s y $V(0) = 0$

Usando $c = 12.5\ kg/s$
$m = 68.1\ kg$
$a = 8.3\ m/s$
$b = 2.2$
$V_{max} = 46\ m/s$
$g = 9.81\ m/s^2$

* Euler

$$V(0) = 9.81\ m/s^2 - \frac{12.5\ kg/s}{68.1\ kg}\left(0 + 8.3\ m/s\left(\frac{0}{46\ m/s}\right)^{2.2}\right) = 9.81\ m/s$$

$$V_1 = 0 + (9.81\ m/s^2)(0.1) = 0.981\ m/s$$

$$V(0.1) = 9.81\ m/s^2 - \frac{12.5\ kg/s}{68.1\ kg}\left(0.1 + 8.3\left(\frac{0.1}{46}\right)^{2.2}\right) = 9.79\ m/s$$

$$V_2 = 0.981 + 9.79 \cdot (0.1) = 1.96\ m/s$$

$$V(0.2) = 9.81\ m/s^2 - \frac{12.5\ kg/s}{68.1\ kg}\left(0.2 + 8.3\left(\frac{0.2}{46}\right)^{2.2}\right) = 9.77\ m/s$$

$$V_3 = 1.96 + (9.77)(0.1) = 2.937\ m/s$$

*Iteraciones con Runge-Kutta 2do Grado

$t=0 \quad V(0)=g-\frac{c}{m}\left(v(0)+a\left(\frac{V(0)}{V_{max}}\right)^b\right) \quad K_1=F(V_0)=9.81 \quad V_{mid}=y_i+\frac{1}{2}K_1 h$

$V_{mid}=0+\frac{1}{2}(9.81)(0.1)=0.4905$

$K_2=9.81\frac{m}{s^2}+\frac{12.5}{68.1}\left(0.4905+8.3\left(\frac{0.4905}{46}\right)^{2.2}\right)=9.720 \quad V_1=0+(0.1)(9.720)=0.972$

$K_1=F(0.972) \quad K_1=9.81-\frac{12.5}{68.1}\left(0.972+8.3\left(\frac{0.972}{46}\right)^{2.2}\right)=9.631 \quad V_{mid}=0.972+\frac{1}{2}(9.631)(0.1)=1.453$

$K_2=9.81-\frac{12.5}{68.1}\left(1.453+8.3\left(\frac{1.453}{46}\right)^{2.2}\right)=9.542 \quad V_2=0.972+(0.1)(9.542)=1.926$

$K_1=9.81-\frac{12.5}{68.1}\left(1.926+8.3\left(\frac{1.926}{46}\right)^{2.2}\right)=9.455 \quad V_{mid}=1.926+\frac{1}{2}(9.455)(0.1)$

$V_{mid}=2.398$

$K_2=9.81-\frac{12.5}{68.1}\left(2.398+8.3\left(\frac{2.398}{46}\right)^{2.2}\right)=9.367 \quad V_3=1.926+(0.1)(9.367)=2.863$

*Iteraciones con Runge-Kutta 4to Grado

$K_1=f(V(0))=9.81$

$V_{med}=0+0.05(9.81)=0.491$

$K_2=9.81-0.122=9.677$

$V_{med}=0+0.05(9.677)=0.483$

$K_3=9.689$

$V_c=0+0.1(9.678)=0.967 \quad K_4=9.558$

$V_1=0+\frac{0.1}{6}(9.81+(2)(9.677)+2(9.689)+9.558=0.967$

$K_1^2=9.557 \quad V_{a_2}=1.445 \quad V_{b_2}=1.939 \quad V_{c_2}=1.911$

$K_2^2=9.638 \quad K_3^2=9.439 \quad K_4^2=9.321$

$V_2=1.911$