Ecuacion diferencial no lineal

$$\frac{dU}{dt} = U^q, \quad t \in [0,10] \quad U(0)=1$$

$$U^{-q}dU = dt \qquad \int U^{-q}dU = t+C$$

Si $q=1$: $\int \frac{dU}{U} = t+C \quad \ln U = t+C \quad U = Ae^t$

$U(0)=1 \quad A=1 \quad \underline{U(t)=e^t}$

Para cualquier otro caso:

$$\int U^{-q}dU = t+C \qquad \frac{U^{-q+1}}{-q+1} = t+C$$

$$U = (t(-q+1)+C(-q+1))^{\frac{1}{-q+1}}$$

$$U(0)=1 \quad 1 = C(-q+1) \quad C = \frac{1}{(-q+1)}$$

$$\underline{U(t) = (t(1-q)+1)^{\frac{1}{1-q}}}$$