

Métodos Computacionales
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Multipro Simplectico

1 Resolver la ecuación diferencial no lineal:

$$\frac{du}{dt} = u^q, \quad t \in [0, 10].$$

$$\Rightarrow \frac{du}{dt} = u^q$$

$$\Rightarrow \int_0^{10} \frac{du}{u^q} = \int_0^{10} dt \quad \rightarrow \text{Hay tres casos: } q=1, q<1, q>1$$

$$\text{Si } q=1: \int \frac{du}{u} = \int_0^{10} dt \rightarrow \ln(u) = t \Big|_0^{10} \\ \rightarrow u = e^t \Big|_0^{10} = 22025, 46$$

$$\text{Si } q < 1: \int u^q du = \int_0^{10} dt \Rightarrow$$

$$\frac{u^{q+1}}{q+1} = t \Rightarrow u^{q+1} = t(q+1) \\ \rightarrow u = [t(q+1)]^{\frac{1}{q+1}}$$

$$C_1 = \frac{1}{q-1}$$

$$q = [0, 0.2, 0.4, 0.7, 0.9, 1]$$

$$t \in [0, 10]$$

$$\rightarrow t=0, u(t)=1$$

$$\begin{cases} u(t) = e^t & q=1 \\ u(t) = [t(1-q)+1]^{\frac{1}{1-q}} & q < 1, q > 1 \end{cases}$$