SIR model equations

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SIR model was introduced by Kermack y McKendrik (1927). It considers three groups in the population:

- **Susceptible (S)**: Person without immunity to the infectious agent, susceptible to be infected.
- **Infected (I)**: Person infected. It can transmit the disease to susceptible if they are in contact with them.
- **Recovered (R)**:Person recovered, that have immunity. They don't spread the disease if they enter in contact with other person.

Total population it's equal to N (the sum of all this group).
$N = S + I + R$
Equations to solve the model:

$$\frac{dS}{dt} = -\beta \times \frac{S(t) \times I(t)}{N} \tag{1}$$

$$\frac{dI}{dt} = \beta \times \frac{S(t) \times I(t)}{N} - \frac{1}{\tau_i} \times I(t) \tag{2}$$

$$\frac{dR}{dt} = \frac{1}{\tau_i} \times I(t) \tag{3}$$

β: is the mean number of contact of a person per day times the probability to infect. In an extreme case, where the probability is 100% it can be interpreted as the mean number of contact of an infected person per day.

τ_i: is the mean time, in days, that last the disease.