What Is A System

Another Ximera activity

To introduce the concept of a system of ODEs, let's consider the *Lotka-Volterra predator-prey model*, which describes two animal species in the wild, traditionally referred to as "rabbits" (the prey) and "foxes" (the predator). Denoting by $R(t)$ and $F(t)$ the rabbit and fox populations, respectively, we use the following differential equations to model the dynamics of the two species in the wild:

$$R' = aR - bRF \tag{1}$$
$$F' = cF + dRF \tag{2}$$

How do ecologists come up with this model? This is not a simple question, since there usually are many possible ways of modeling a real-world system. As a rule of thumb, scientists try to use the simplest possible model as a first approximation. For the predator prey model, the following are reasonable hypothesis:

Learning outcomes:
Author(s):