SIR MODELS

The SIR model divides a population into 3 groups: the susceptible, the infected, and the recovered/resistant. We then track those 3 subpopulations using the following variables:

S is the number of susceptible individuals
I is the number of infected individuals
R is the number of recovered/resistant individuals

All 3 variables change over time, so we'll need to remember that they're functions of time. At all times we assume that the total population is the same: $S(t) + I(t) + R(t)$ is constant.

1. How do you think $S(t)$, $I(t)$, and $R(t)$ should work? Sketch a (rough) graph of all 3 functions on a single set of axes.

2. Now we'll try to be more sophisticated and mathematical. Apply pillar 2 and **track the changes** to fill in the right side of the following equations (we'll do this as a class).

$S' =$
$I' =$
$R' =$

Date: September 1, 2023.

3. Suppose $S(0) = 100$, $I(0) = 1$, and $R(0) = 0$. Also let $a = 0.01$ and $b = 0.125$ with time measured in days. Apply pillar 5 and go **one step at a time** to make predictions.

a) Predict $S(1)$, $I(1)$, and $R(1)$

b) Predict $S(2)$, $I(2)$, and $R(2)$

c) (Optional) Predict $S(3)$, $I(3)$, and $R(3)$