Warm-up:
Using our model, some initial values for $S$, $I$, and $R$, and different values of $\Delta t$ in the Excel spreadsheet some predictions about the future population sizes after 3 days can be made.

$$S'(t) = -0.0001S(t)I(t)$$
$$I'(t) = 0.0001S(t)I(t) - \frac{1}{14}I(t)$$
$$R'(t) = \frac{1}{14}I(t)$$

$$S(0) = 45,400 \quad I(0) = 2100 \quad R(0) = 2500.$$
The concept of LIMITS: The concept of a limit is a central theme of all Calculus courses. When using the Babylonian Algorithm to estimate $\sqrt{a}$, the sequence of successive approximations

\[
\begin{align*}
    x_1 &= \\
    x_2 &= \frac{x_1 + \frac{a}{x_1}}{2} \\
    x_3 &= \frac{x_2 + \frac{a}{x_2}}{2} \\
    &\vdots \\
    x_n &= \frac{x_{n-1} + \frac{a}{x_{n-1}}}{2} \\
    &\vdots
\end{align*}
\]

stabilizes. We say that the limit of the sequence of successive approximations is $\sqrt{a}$, or, rather, that

\[
\lim_{n \to \infty} x_n = \sqrt{a}.
\]

**Formal Definition**

The limit $L$ of a sequence $x_n$ is said to exist if *for any* $\epsilon$ there exists a number $N$ so that when $n > N$, $|x_n - L| < \epsilon$.

What does this mean?

**Think-Pair-Share Exercise**

Write down a sentence in your own words expressing the definition of a limit of a sequence.

Then share your definition with your neighbor.

The Babylonian Algorithm on your TI-83

- Let’s Store the value of $A$ 7 STO→ ALPHA A
- Let’s store the initial guess of $\sqrt{A}$ 1 STO→ X
- Successively approximate $(X + A/X)/2$ STO→ X