Class 7: *Monday, September 19*

Euler's Method and the S-I-R Model

You are familiar with using Euler's Method to find piecewise linear functions approximating the solution of an initial value problem with a single rate equation. The S-I-R model, however, consists of *three* rate equations concerning three different functions – $S(t)$, $I(t)$, and $R(t)$. In this class, you will see how Euler's Method can be extended to a more complex model of this sort to produce one piecewise linear function approximating $S(t)$, another approximating $I(t)$, and a third approximating $R(t)$.

Homework 3: Handed out in Class.

Lab 3: *Monday September 19 or Tuesday, September 20*

Investigating an S-I-R Model of Disease

QUIZ 3 IN LAB

Class 8: *Wednesday, September 21*

Qualitative Analysis of the S-I-R Model

Reading: *Smith & Minton* Section 2.1, and pp. 242-244.

There are some qualitative features of the solutions to the S-I-R model that can be discovered from the rate equations without applying Euler's Method. We will investigate some of these.

Class 9: *Friday, September 23*

Local Linearity and the Microscope Approximation

Reading: *CiC* Section 3.2 and 3.3.

As one *zooms in* on the graph of some functions at certain points, the graph looks more and more like a straight line – the line *tangent* to the graph of the function at that point. Such a function is said to be *locally linear* at that point. Since the slope of a line is well-defined and easily computed, this suggests a way of *defining* the "slope of the graph" at that point (even though the graph really isn't a straight line). It also suggests a way of approximating this slope using the slope of a *secant* line. This approximation idea is embodied in the *microscope approximation*.

Homework 4: *CiC* Section 3.3: 13, 14, 17, 18

HOMEWORK 3 DUE IN COURSE HOMEWORK BOX BY 5:00 PM.