Lab Assignment 2

Audrey Yang

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Problem 1

The parameters that gave me the best fit is a carrying capacity of $B = 13$, initial population of $N_0 = 0.05$, and an intrinsic growth parameter of $r = 0.4$.

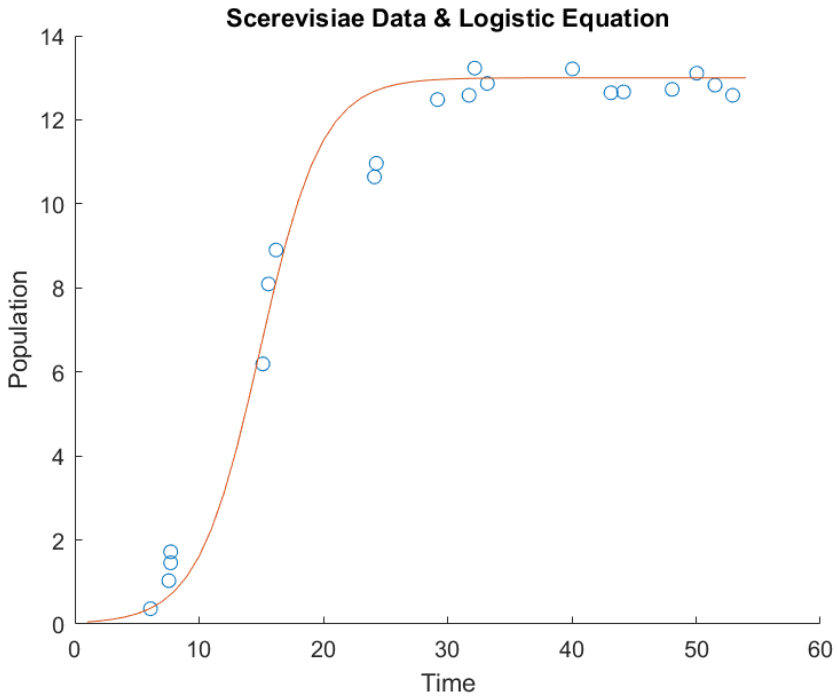

Figure 1: Scatter plot of SCData and a logistic plot approximation

Problem 2

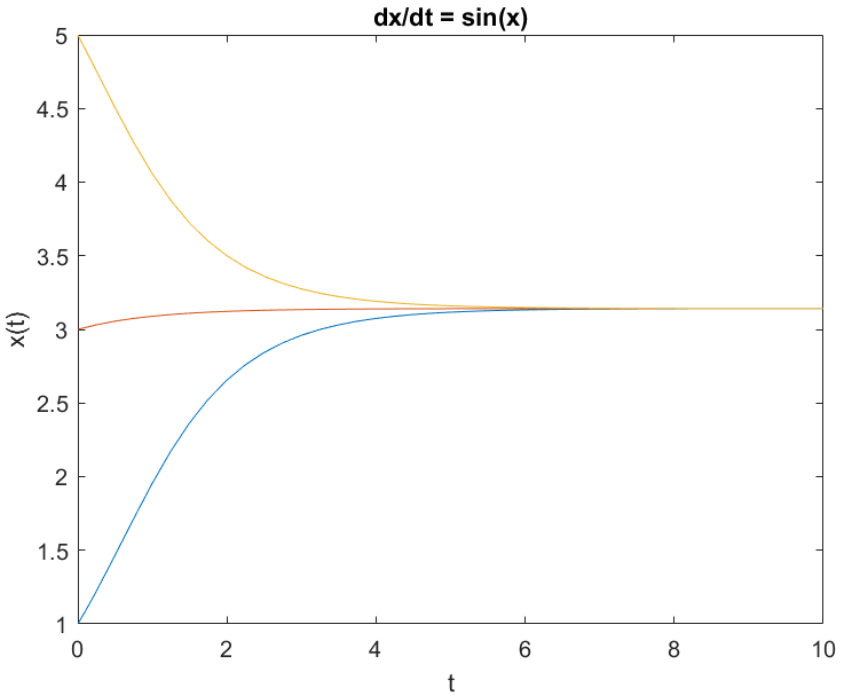

Figure 2: Plot of the ODE $sin(x)$. The blue line is $x = 1$, red line is $x = 3$, and yellow line is $x = 5$

The three curves converge at a little over 3, which is most likely π as the ODE is a trigonometry function. From our geometric analysis, we can see that if the initial condition is less than π, then the curve increases, rapidly at first, then slower, until it stabilizes at π.

We can see that function is stable in the long term, stabilizing at π.

Problem 3

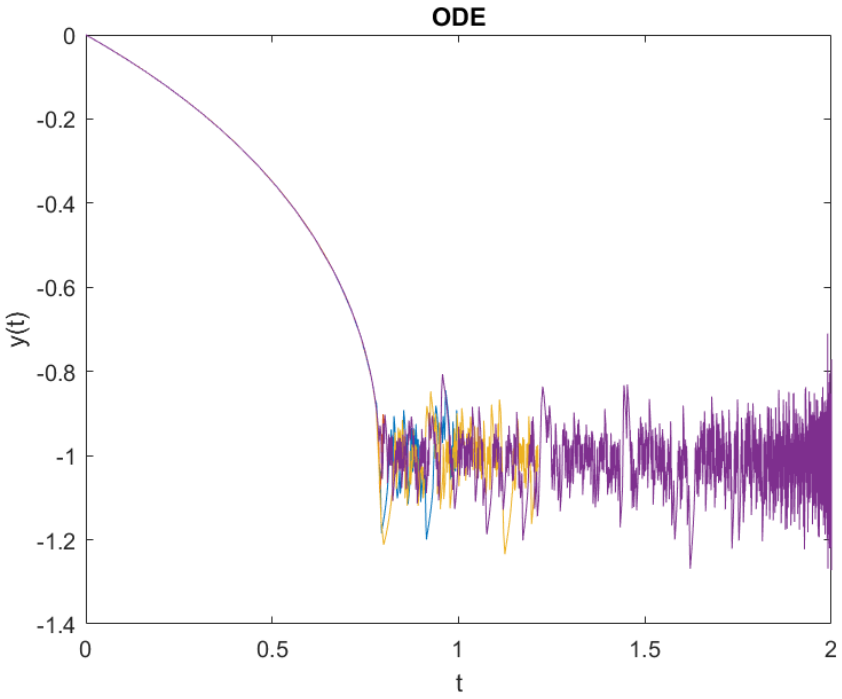

Figure 3: Plot of the ODE $\frac{1}{(y+1)(t-2)}$ where $y = 0$, with varying upper bounds for t

When I try to numerically solve the ODE outside the solution space (here, where the range of t is $(0, 3)$, MATLAB gives the following warning:

```
Failure at t=2.000000e+00.  Unable to meet integration tolerances without
reducing the step size below the smallest value allowed (3.552714e-15) at time
t.
```

And it will not show the graph of the ODE beyond the solution space.