Section 1.2 (Previously Assigned):

- Section 1.2, p. 16: #2 [Use only 1790-2000 for your data to construct the model. Then use your model to predict the population for 2010 and see how it compares.]
- Section 1.2, p. 16: #1, 6-8 [Note: #1 moved to this assignment since it is better modeled using the constrained growth model.]

Additional Assignments from Single Population Modeling Worksheet:

- (Excel) Consider a population of whales where the carrying capacity is 5000, the extinction level is 500, and $k = 0.0001$. Iterate the model from #4 up to $n = 40$ for the following initial conditions $a_0 = 499, 500, 501, 1000, 5000, 6000$. Graph the solutions all on the same graph and include a legend. [Note: If any of the populations become negative, replace those values with 0 before graphing.]
- Expand the terms (e.g. distribute, FOIL, etc.) in both the Constrained Growth (#3) and the Carrying Capacity-Extinction (#4) Models. [Use the p_{n+1} form.] Compare the two models in this form and determine whether you think these two models are significantly different or essentially the same. Justify your answer. [Hint: You may want to consider the graphs of both models if you let $y = p_{n+1}$ and $x = p_n$.]

Section 1.3, p. 31: #13, 14, 1(a,c), 2(b,d), 3(b, c, d) // 1(e, f), 2(g, h, i, k) 4(a,c), 6-9, 11:

- #13 There is a typo in the problem. The model should read $r_{n+1} = r_n + kr_n(1000 - r_n)$ [Iterate with Excel.]
- #14 You may get unusual behavior for this problem. We'll discuss the reasons later. [Iterate with Excel.]
- #1(a,c, // e,f) Just find the analytical solution. [Do not iterate with Excel.]
- #2(b, d // g, h, i, k) Should be self-explanatory.
- #3(b,c,d) Build a numerical solution and graph it. [Iterate with Excel]
- #4(a,c) Just use the analytical solution. [No need to iterate.]
- #6-9 Use the analytical solution to solve the system and find any other values asked for. Do **NOT** iterate them (despite what the book may say). I want to see that you can solve them analytically.
- #11 Use whichever method (analytical or numerical) that works for you.

Build a Numerical Solution means to iterate the system and keep track of the values in a table (and often a graph). [Usually use Excel.]

Solve the System Analytically means to use the appropriate general form of the solution derived in class and given below:

The system $\begin{array}{rcl} a_{n+1} & = & ra_n \\ a_0 & & \text{given} \end{array}$ has the analytical solution $a_k = a_0 r^k$, for $k = 0, 1, 2, \ldots$

The system $\begin{array}{rcl} a_{n+1} & = & ra_n + b \\ a_0 & & \text{given} \end{array}$ has the analytical solution $a_k = cr^k + \dfrac{b}{1-r}$, for $k = 0, 1, 2, \ldots$,

where c is determined by using the initial condition (or another value, if given).