The problem numbers refer to problems from your text book. I will often assign problems which are not in the text book. Problems with a $\star$ are optional, and will not count towards your grade.

Assignment 1: Assigned Fri 04/04. Due Wed 04/09

1. **Section 2.2** 7, 9, 13.
2. **Section 2.3** 3.
3. **Section 2.5** 1, 2, 6
4. **Section 2.7** 6

Assignment 2: Assigned Wed 04/09. Due Wed 04/16

1. **Section 2.7** 7.
2. **Section 2.8** 7, 8.
3. **Section 3.1** 2, 3, 5
4. **Section 3.2** 4, 6
5. **Section 3.3** 1
6. **Section 3.4** 1

Assignment 3: Assigned Wed 04/16. Due Wed 04/23

1. **Section 3.4** 11, 16
2. **Section 3.6** 2, 6
3. **Section 3.7** 3, 5
4. **Section 4.1** 3
5. **Section 4.3** 2

Assignment 4: Assigned Wed 04/23. Due Wed 04/30

1. **Section 4.3** 6, 8, 10
2. **Section 4.5** 3
3. **Section 5.1** 1, 9, 10
4. **Section 5.2** 2, 5, 14*. [I encourage you to try 14]

Assignment 5: Assigned Wed 04/30. Due Wed 05/07

1. **Section 6.1** 2*, 6*, 13*, 14
2. **Section 6.2** 2
3. **Section 6.3** 2*, 8, 16
4. **Section 6.4** 6 [Part (c) is 'unfortunately' the example I randomly chose to do in class.]
5. **Section 6.5** 8, 9, 10, 11
6. Consider the Volterra-Lotka system with 'fishing': $\dot{x} = x(1 - y - \alpha)$ and $\dot{y} = y(x - 1 - \beta)$.
   (a) When α, β are small, find the equilibria, and verify that the population of the prey x, is *higher* at this equilibrium, than it was at the equilibrium in the Volterra Lotka system without fishing (i.e. $\alpha = \beta = 0$).
   (b) Show that for small values of α, β, the system is still conservative. Find explicitly the conserved quantity. How small do α, β have to be for this to work? Finally sketch a phase portrait of the system in this situation.
   (c) What happens to this system when α or β is large? Investigate all cases, and sketch a phase portrait in each case.