Dynamical Systems: Homework List

§ 1.1 *Examples of Dynamical Systems*
read at your leisure

§ 1.2 *Definitions from Calculus*
# 1, 2, **<u>3</u>**

§ 1.3 *analyzing orbits and periodic points*
# 1, 2, four functions from Dr. Crannell, **<u>7, 10</u>**

§ 1.4 *hyperbolicity and bifurcations*
# 1, 2, **<u>5, 7</u>**

§ 1.5 logistic map and Cantor set
# one of (2 or 3 or 5), 6, **<u>9, 10</u>**

possible digression to material from Mañe:
omega limits and non-wandering sets

§ 1.6 *symbolic dynamics*
# 1, 2, 3, **<u>4</u>**

digression to research of Steve May ('07):
Fibonacci Harps and shifts of finite type

§ 1.7 *topological conjugacy*
# **<u>1</u>**, 2c, 3ab

§ 1.8 *definition of chaos*
# **<u>5, 11</u>**

digression to BBCDS:
sensitive dependence on initial conditions is redundant

§ 1.9 *structural stability*
(skip ?)

§ 1.10 *Sarkovskii's Theorem*
1) Construct a function f:I→I with every point having period 3.
2) Construct a continuous function f:X→X (where X is a connected space of your choosing) with every point having period 3.
3) Construct a continuous function f:I→I that has a period-15 point but no period-13 point.
4) Construct a continuous function f:I→I that has a period-16 point but no period-8 point.

§ 1.11 *Schwartzian derivatives*
§ 1.12 *bifurcation theory*
§ 1.13 *period 3 revisited*
(probably skip?)

§ 1.14 *maps of the circle*
a) Is τ_ω chaotic if ω is rational?
b) Is τ_ω chaotic if ω is irrational? Why or why not?
c) Prove the doubling map on S^1 is chaotic by using an appropriate topological conjugacy.

Crannell will assign additional exercises, as she sees appropriate, along the way. If (and when?) we have additional time toward the end of the semester, we'll either look at the skipped sections from chapter 1 or the material on the complex quadratic map, Mandelbrot set, and Julia sets from Chapter 3.