Homework 6: Prepare for the midterm exam 1

Existence-Uniqueness
Be able to answer questions about proofs of major theorems.
Apply continuation theorem to prove global existence in specific problems (similar to homework problems).
Be able to verify group property.
Parameter dependence, e.g. compute derivative of the solutions wrt parameters.

Linear systems
Calculating exponent of a matrix. General properties of matrix exponents.
For time-periodic linear systems, be able to find fundamental matrix, Floquet exponents.
Gronwall type inequalities. (proofs and applications)

Lyapunov stability theorems
Proofs of both theorems.
Be able to find Lyapunov functions in simple systems.

Discrete dynamics
Linear maps. Stability of equilibrium.
Periodic orbits. Stability.
Tent map, $2x \text{ mod } 1$ map, logistic map.