The exam will be closed book, closed note, with the sole exception that you are permitted to prepare and bring to the test a formula sheet/review notes covering up to two sides of one 11x8 sheet of paper. The exam will involve several homework-style problems + short answer questions focusing on definitions, explanations, assumptions and overall knowledge of the subject. You will need a calculator to do the test, but no other electronic devices are permitted. The honor code is in effect. Don’t forget to bring a calculator and blank paper to the exam. The exam is cumulative. It will test the material summarized on the review sheets for tests 1, 2 and 3, plus the following material.

**Linearized theory/Transonic flow** Know the assumptions of small disturbance theory and the restrictions they impose (including Mach number ranges). Know the linearized form of the pressure coefficient. Know the definition of the velocity potential and know why we use it. Know what the affine transformation is, be able to explain what it does. Know the Prandtl-Glauert rule, its range of application, and be able to apply it. Be able to define (in words) the critical pressure coefficient and the critical Mach number, and describe what their physical significance is for flow over an airfoil. Know what is meant by drag divergence. Be able to explain why it occurs and what the principle source(s) of drag in transonic flow are. Be able to sketch a supercritical airfoil, explain why it is designed as it is. Be able to sketch the typical pressure distribution on a supercritical airfoil, and compare it with that on a conventional airfoil. Be able to explain the independence principle. Be able to explain how sweep works, particularly its role in reducing drag at transonic speed. Be able to state the approximate relations for the effects of sweep on critical and drag divergence Mach number. Be able to explain qualitatively what sweep does to lift and the lift curve slope. Be able to explain what the Sears Haack body is. Be able to explain the area rule.

**Homeworks, class examples and Tables**
Know how to do all the homework problems, tests and class examples and variations under test conditions. Questions similar to the homeworks/test questions/class examples will appear on the exam. Solutions to all homeworks and tests are posted on the course website. Know how to use the NACA 1135 charts and tables and Anderson tables A.3 and A.4 to perform all calculations.