Several baseline codes have been made available to you. They have been and will be explained in class. These need to be understood and tested, so they can serve as a baseline for the code you will develop to evaluate your designs. The following exercises are some steps along this path. However, these are only meant to be suggestive. Additional warmup work has also been outlined.

1. Trajectory people (for each):
   Study the trajectory code and the equations on which it is based. Study definitions of elliptical orbits as described in Bate or another text. Compile the trajectory code. Using simple analytic expressions, determine initial conditions for a sample satellite in the 100 nm orbit. Use the code to compute the trajectory of this satellite through one full revolution. How far (in longitude) has the earth rotated under the satellite during one orbit? Using simple analytic expressions, compute this same longitude, and compare to the numerical result. How accurate is the code for this simple test case? Run some synergetic or reentry cases using a sample vehicle design. Plot them up, to start to get some familiarity with the system. Look at the stagnation point temperatures for various trajectories. Discuss the results with the other group members.

2. Aerothermodynamics:
   Study the aerodynamics subroutines and the equations on which they are based. Compile and run the aerotest and aeroprop routines (from sps.prgm or one of the previous groups). Plot out the trimming properties for the sample vehicle. Reduce the flap chord by a factor of 2 and compare the results to those for the sample vehicle. Then, run the code with a wider range of c.g. locations - wide enough that the vehicle becomes untrimmable for the farthest aft and forward locations. Compare the results. Does this begin to give you a feel for trim and c.g. requirements? Discuss the results with the other members of your group.

3. Structures:
   Collect data for a variety of TPS materials from the TPSX public-domain website. Examine the densities, temperature limits, and so on. Collect data for a variety of structural materials also. Consider what materials may be optimum for various parts of your structure, and why. Study the website material regarding structural design. Learn to run the CGMOI code (or a substitute) for determining c.g. location and moments.

4. Propulsion:
   Collect data for various boost and vehicle engines. Collect data on materials which may be useful for tank design. Collect formulas for sizing tank thicknesses. Study the boost.for program, and add comments to it as you begin to understand its functions.

The group should give a presentation of about 2 hours, from 1:30-3:20PM. Paper copies of the viewgraphs should be provided for Prof. Schneider and the TA. In addition, backup material such as code listings may be handed in on additional sheets of paper.