1. Study the following visible satellite image and discuss the following (referring to specific locations in the image to support your discussion, and explaining your answers):
   a) what is the likely synoptic setting?
   b) what mesoscale phenomena are visible?
   c) which areas of cloudiness are stratiform?
   d) which areas of cloudiness are cumuloform?
2. Study the following infrared satellite image and discuss the following (referring to specific locations in the image to support your discussion, and explaining your answers):
   a) the temperature at the surface is approximately?
   b) the temperature at the tropopause is approximately?
   c) assume a reasonable depth for the troposphere and compute the lapse rate
   d) how would you characterize the stability of this lapse rate?
3. Study the following radar images and discuss the following (referring to specific locations in the image to support your discussion, and explaining your answers):
   a) what are locations of local rotation (in/near the storm cells)?
   b) what are locations of local convergence (in/near the storm cells)?
4. Study the following radar radial velocity image; using the height-range plot, determine the approximate wind direction and speed at the following heights:

- Range rings are every 20 km
- a) 1.5 km above ground level
- b) 3 km AGL
- c) 4.5 km AGL
- d) 6 km AGL
5. Beginning with equations (2.32) and (2.33) in the textbook, explain the meaning of the geostrophic approximation. In other words, what is assumed to be negligible?

6. Beginning with equations (2.34) in the textbook, explain the meaning of the hydrostatic approximation. In other words, what is assumed to be negligible?

7. Compare equations (2.17-2.20) with equation (2.34) in the textbook. Explain how horizontal convergence/divergence is related to vertical motions. What actually *causes* vertical motions?