8. Answer the following questions based on the enclosed analysis of thickness between 1000 and 500 mb. There may be several correct answers. But you only need to give one of them. Notations on the analysis should be in large red letters.
   a. Place an "X" at the location where geostrophic winds vary most in the layer.
   b. Pace an "Y" at the location where geostrophic winds vary least in the layer. Pick a location between two thickness lines – not at the edge of the analysis.
   c. Place a "Z" at the location where the mean virtual temp. in the layer is the coldest.
   d. Draw the orientation of the thermal wind vector at point "F" on the map.
   e. At point T, the wind direction at 1000 mb is from the south at 10 kt, is cold or warm advection occurring in the 1000-500 mb layer?
9. Draw a cross section through a cold front. Label the warm and cold areas. Draw two isotherms (solid lines) intersecting the front, labeling them T and $T+\delta T$. Also draw two isolines of potential temperature (dashed) intersecting the front, labeling them θ and $\theta+\delta\theta$.

• Answer the following questions in the spaces provided. Give complete answers that demonstrate your knowledge of the material. Assume that the grader (Fuelberg) knows nothing – you must explain or show everything to hie. If key points of an answer are omitted, he assumes that you don't know them. When diagrams are requested, you also mush EXPLAIN those diagrams.

1. The sketch below shows a frontal wave and an associated dry line. Likely air masses are mT, cT, and mP. Label these air masses in their proper locations on the diagram. If this analysis were for 5 AM, would the coldest air likely be located east or west of the dry line? Explain your answer below.

2. Define frontogenesis in terms of what we see on a typical constant pressure analysis.
   List the four processes that cause frontogenesis. Each is represented by a term of an equation. 1. 2. 3. 4.
   Describe ONE of these four processes in detail, using a sketch as part of your answer. Your example should describe frontogenesis – NOT frontolysis.
3. Draw a cross section through a cold type occluded front. No isotherms or theta lines are needed. Label the various regions cold, coldest, and warm. Show the direction of motion with an arrow.
   Where in the United States are cold occluded fronts typically found?
   Which locations have maximum cyclogenesis in the vicinity of the contiguous United Sates?
4. Where does cyclogenesis tend to occur with respect to an upper level trough/ridge pattern? Be very specific.
   What kind of vorticity advection occurs there? Is there upper level divergence or convergence in that region?