ATM 317  
Homework 4  
Due: Friday, April 22

1. The figure below shows geopotential height at 1000 hPa (red) and 400 hPa (blue). Use a hand analysis to draw and label the 1000-400 hPa thickness contours. (e.g., $\phi' = \phi_{400} - \phi_{1000}$)

2. After the thickness field analyzed, draw arrows, with appropriate magnitude and direction, to represent the thermal wind in the 1000:400 hPa layer.

3. Use the Sutcliffe-Trenberth form of the QG-omega equation to approximate and label regions of both upward and downward vertical motion in the figure below. Explain why you would expect upward and downward motion where you have it marked.