

Homework #8
AOS 101 – Section 305
DUE: April 25th, 2008

Name:

#1. Where will the 500 mb surface be higher above ground level (AGL): at the equator or at the north pole? Why?

#2. Based on your answer to number 1, what will be the direction of the pressure gradient force in the northern hemisphere?

Multiple Choice

#3. In the Southern Hemisphere, lower thickness values are found: _____
(Extra Credit 1Pt Possible)

- A. to the left of the geostrophic wind vector
- B. to the right of the thermal wind vector
- C. to the right of the geostrophic wind vector
- D. to the left of the thermal wind vector

#4. Thermal wind is defined as: _____

- A. wind that causes temperature advection
- B. vector shear of the geostrophic wind between two pressure levels
- C. warm air advection
- D. cold air advection

#5. (a) Using what you know about thickness and thermal wind, explain why upper-level winds across the continental United States are always westerly. (Hint: It's cooler in the north than in the south.)

(b) In January, the average high temperature for Minneapolis, MN is 22°F and for Little Rock, AR is 57°F (a difference of 35°F). In August, the average high temperature for Minneapolis is 86°F and for Little Rock is 90°F (a difference of 4°F). How does this information account for the observation that the jet stream is stronger (faster) in the winter than in the summer?

#6. For the wind vector diagrams on the following page, answer the following questions (V_{500} corresponds to the "upper-level" winds at 500 mb, V_{1000} corresponds to "lower-level" winds at 1000 mb).

(a) For the set of wind vectors at each city, draw a thermal wind vector.

(b) On each side of each thermal wind vector, label warm and cool regions.

(c) In San Francisco, CA, are the winds veering or backing? Does this imply warm air advection or cold air advection?

(d) In Atlanta, GA, are the winds veering or backing? Does this imply warm air advection or cold air advection?

#7. For the corresponding set of station models on the following page for Madison (labeled by pressure level), answer the following (Hint: station model lecture might be useful here):

(a) Draw the wind vector diagram with the "upper-level" and "lower-level" wind vectors (such as those used in #6) and label the vectors

(b) Draw the thermal wind vector and label the appropriate regions where you would expect warm and cool regions (just like in part b of #6)