Name: Answer key_____ Student id: _____

ATOC 1050-001 Homework #2 - Due Thursday March 10, 2011

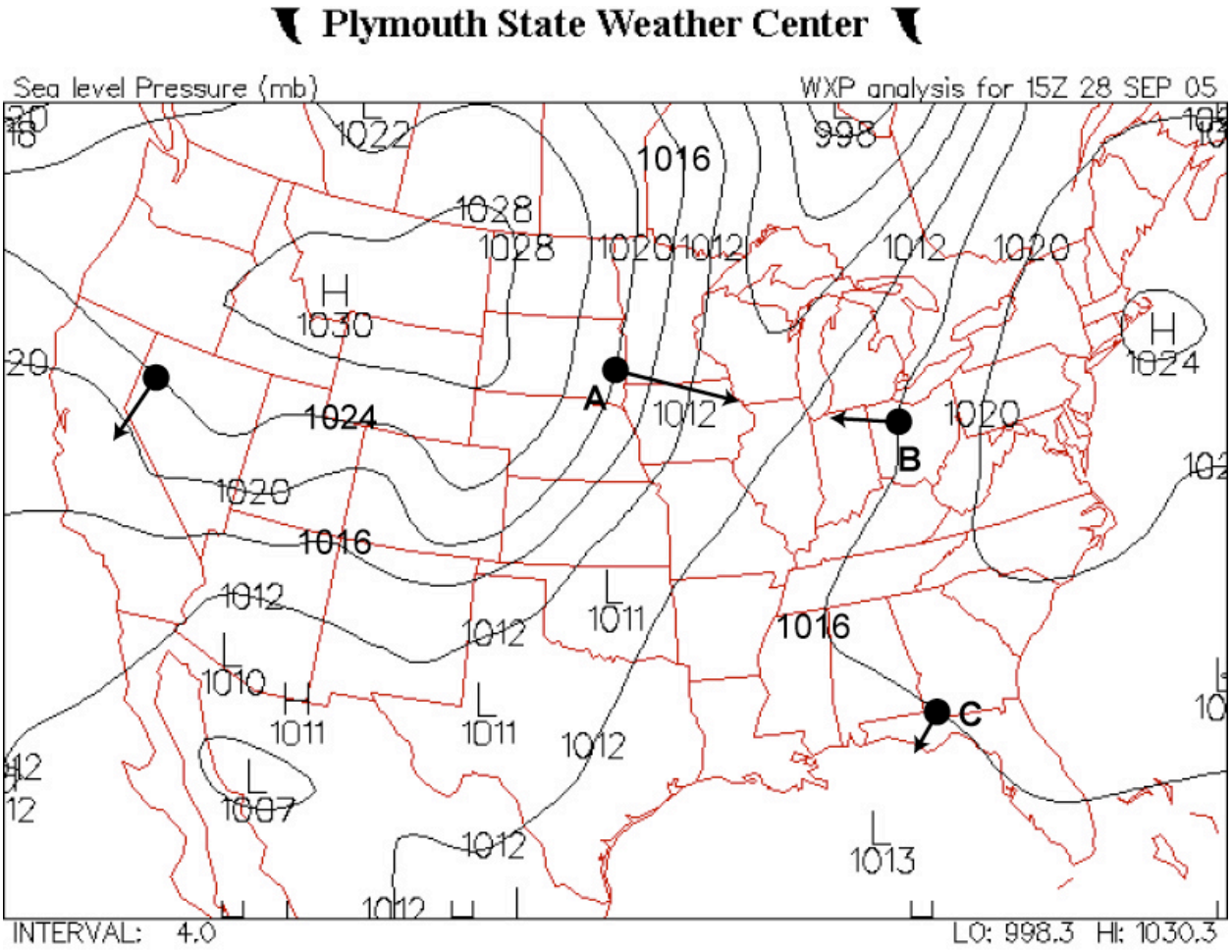
Instructions: Make sure that you answer all of the questions and complete all of the tables for maximum credit. Use appropriate units on all numerical answers.

Please write neatly when completing this assignment – if we can't read your answer you will not get credit for it.

Make sure that your homework is stapled when you bring it to class. Homework assignments that are not stapled will receive a grade of zero.

1. Pressure Gradient Force and Surface Weather Maps

Use the following surface weather map to complete the following problems.



Name: Answer key_____ Student id: _____

1a. (6pts) At each of the labeled dots (A, B, and C) on this surface weather map draw an arrow emerging from the dot to indicate the direction of the horizontal pressure gradient force. Adjust the length of your arrows so that a long arrow indicates a relatively strong horizontal pressure gradient force and a short arrow indicates a relatively weak horizontal pressure gradient force. One arrow has already been drawn for you in Nevada.

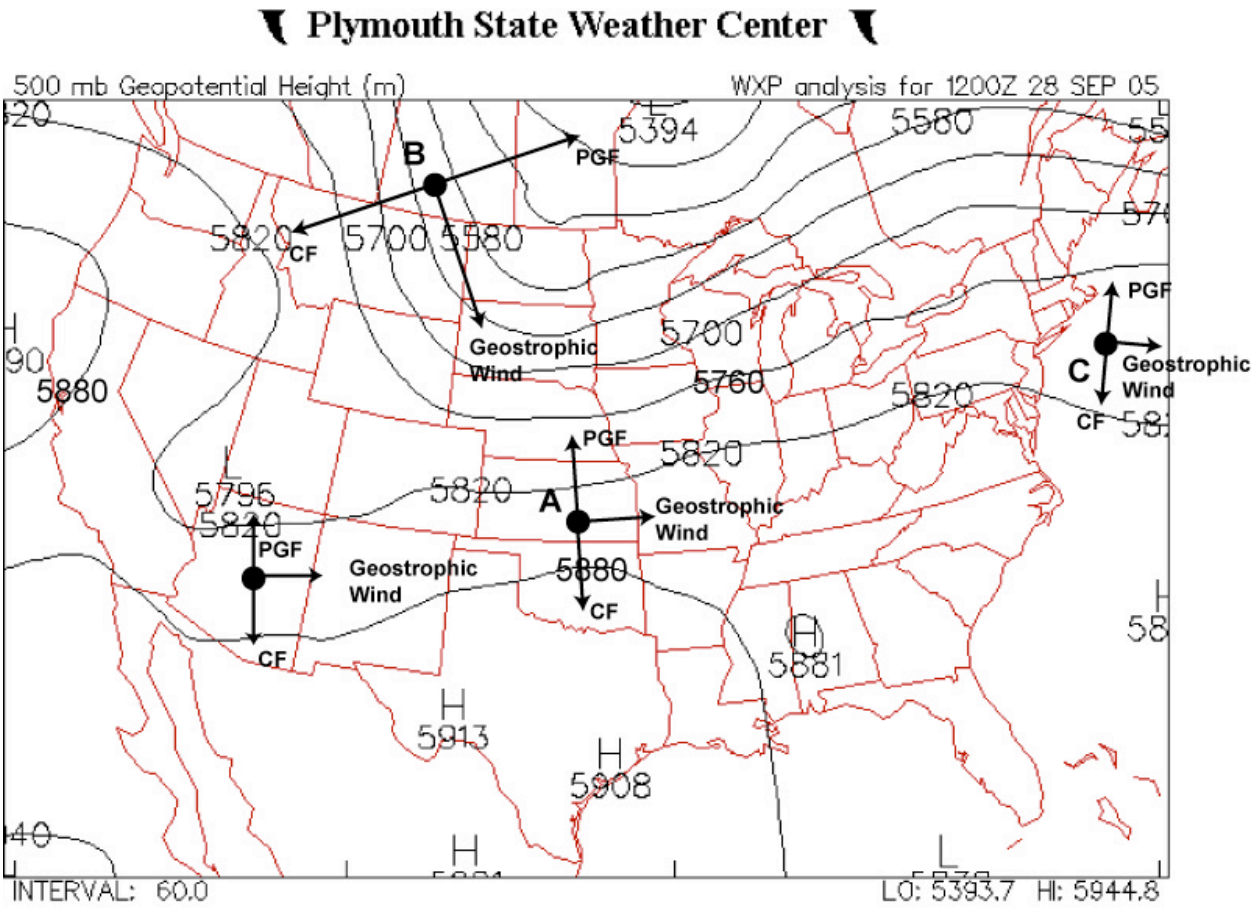
1b. (2pts) At which labeled dot is the horizontal pressure gradient force strongest?
A

1c. (2pts) At which labeled dot is the horizontal pressure gradient force the weakest?
C

1d. (2pts) What features on the surface weather map did you look at to answer questions 1b and 1c?
The spacing of the isobars indicates the strength of the pressure gradient force. The pressure gradient force is large when the isobars are closely spaced and small when they are widely spaced.

2. Geostrophic wind, Horizontal Pressure Gradient Force, and Coriolis Force

Use the following 500 mb constant pressure map to complete the following problems.



2a. (6pts) Draw an arrow showing the speed and direction of the geostrophic wind at each of the 3 labeled dots (A, B, and C) on this map. Each arrow should start at the dot and point in the

Name: Answer key_____ Student id: _____

direction the geostrophic wind is blowing towards and the length of the arrow should represent the wind speed (i.e. the point with strongest geostrophic wind should have the longest arrow and the point with the weakest wind should have the shortest arrow). Label each arrow with the words "geostrophic wind". An arrow showing the geostrophic wind has already been drawn for you in Arizona.

2b. (6pts) Draw a second arrow at each labeled dot to represent the horizontal pressure gradient force (PGF). Each arrow should start at the dot and point in the direction the PGF acts. The length of the arrow should indicate the strength of the PGF (with the longest arrow for the largest PGF and the shortest arrow for the weakest PGF). Label each of these arrows with "PGF".

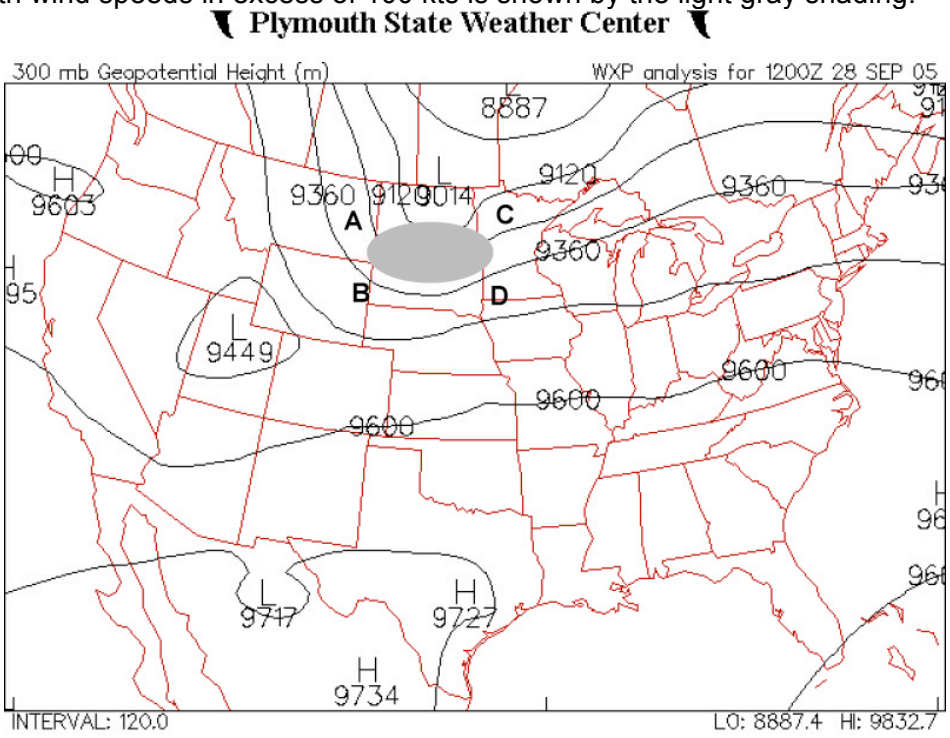
2c. (6pts) Draw a third arrow at each labeled dot to represent the Coriolis force (CF). Each arrow should start at the dot and point in the direction the CF acts. The length of the arrow should indicate the strength of the CF (with the longest arrow for the largest CF and the shortest arrow for the weakest CF). Label each of these arrows with "CF". Hint: The length of the arrows for the CF should be consistent with the length of the arrows you drew for problem 2b for the PGF.

2d. (2pts) At which of the labeled dots is the geostrophic wind strongest?
B

2e. (2pts) What features on this 500 mb map did you look at to answer question 2d?
The spacing of the height contours indicates the strength of the geostrophic wind. The geostrophic wind is strong where the height contours are closely spaced.

3. Divergence, Convergence, Jetstreaks, and Curvature

Use the following 300 mb constant pressure map to complete the following problems. A jetstreak with wind speeds in excess of 100 kts is shown by the light gray shading.



Name: Answer key_____ Student id: _____

Answer the following questions by placing the letters A, B, C, or D in the blanks (1pt for each blank filled in with correct letter).

3a. The right entrance region of the jetstreak is located at __B_____.

3b. The left entrance region of the jetstreak is located at __A_____.

3c. The right exit region of the jetstreak is located at __D_____.

3d. The left exit region of the jetstreak is located at ___C_____.

3e. Convergence due to the jestreak is occurring at ___A_____ and ___D_____.

3f. Divergence due to the jetstreak is occurring at ___B_____ and __C_____.

3g. Convergence due to flow curvature is occurring at __A_____ and ___B_____.

3h. Divergence due to flow curvature is occurring at ___C_____ and ___D_____.

3i. The maximum convergence is occurring at __A_____.

3j. The maximum divergence is occurring at ___C_____.

3k. Based on this map you would expect the surface pressure to be rising most rapidly below ___A_____.

3l. Based on this map you would expect the surface pressure to be decreasing most rapidly below ___C_____.

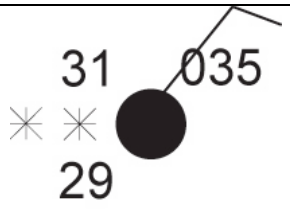
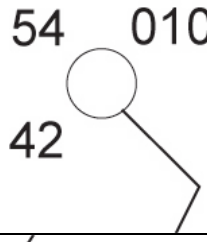
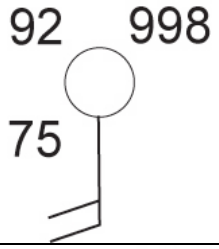
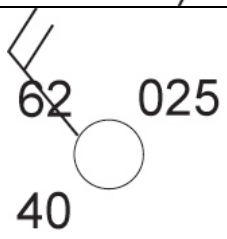
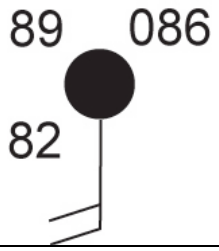
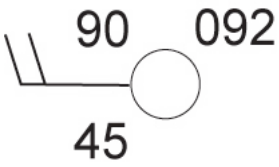
3m. Based on this map you would expect air to be rising most rapidly at ___C_____.

3n. Based on this map you would expect air to be sinking most rapidly at ___A_____.

Name: Answer key_____ Student id: _____

4. Fronts

Each pair of surface station models below shows data from the same station. However, the data were taken 6 hours apart and a front passed the station between the two times. Based on these station models determine what type of front passed the station and complete this table and answer the questions that follow (2pts each).

	Before	After	Type of Front
4a.			Warm
4b.			Cold
4c.			Dryline

4d. What is the temperature before the front passes for problem 4a? 31˚F

4e. What is the decoded sea level pressure before the front passes for problem 4b? 999.8 mb

4f. What is the decoded sea level pressure after the front passes for problem 4b? 1002.5 mb

4g. What is the dewpoint temperature after the front passes for problem 4c? 45˚F

4h. What is the wind direction after the front passes for problem 4b? Northwest

4i. What is the wind speed after the front passes for problem 4a? 10 kts