ATS 351
Lab Assignment 8
Due November 2, 2009

1) (1 point) How does sea-level pressure differ from station pressure? Can the two ever be the same? Explain.

2) (1 point) a) Identify the four forces that affect the movement of air.

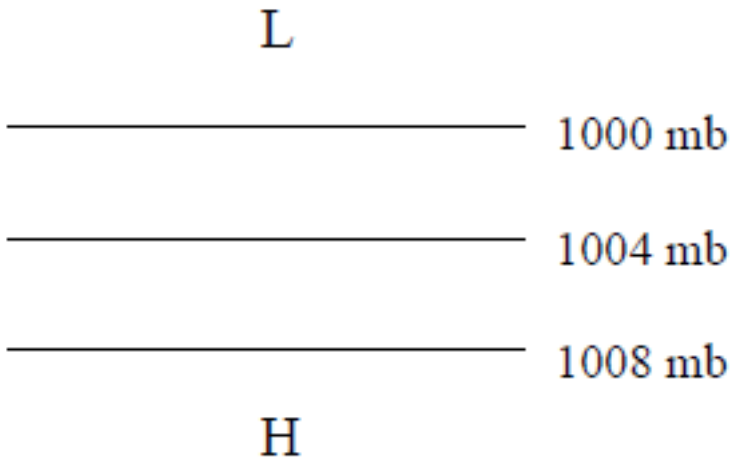
b) Which force *only* influences winds at the surface and not aloft?

3) (1 point) The equation for the Coriolis Force is:

$$Coriolis = 2\Omega \sin\varphi$$

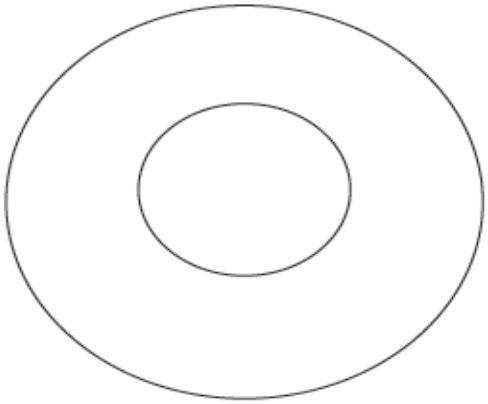
The Earth's angular rate of spin is $7.27 \times 10^{-5}\ s^{-1}$.
Calculate the coriolis force at the following latitudes: 0^o, 30^o, 60^o, 90^o. Based on these results, describe how the coriolis force changes with latitude.
Note: You need to solve this equation using radians, not degrees. To convert from degrees to radians, simply multiply your degree by pi and then divide by 180.

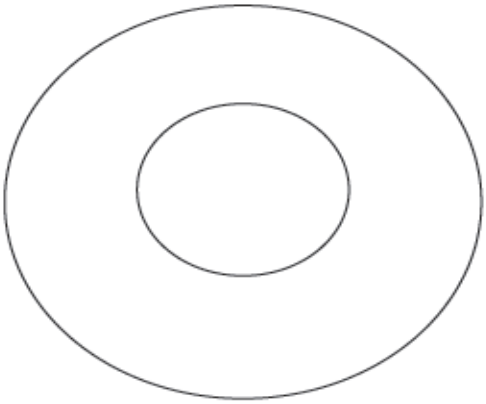
4) (1 point) Assuming geostrophic and frictionless flow, please draw vectors for the pressure gradient and coriolis forces for the Northern Hemisphere.



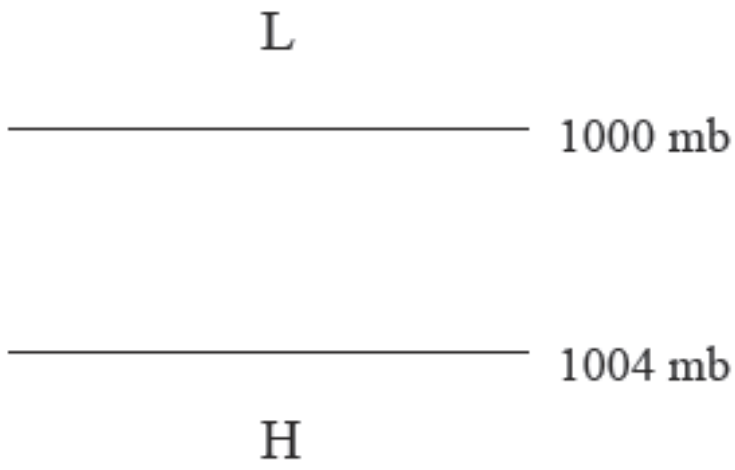
5) (1 point) Are geostrophic winds a good approximation for surface winds? Please explain why or why not.

6) (1 point) Given the pictures below of low and high pressure, please draw the direction of the flow and the force vectors associated with areas of low and high pressure. Please give a brief discussion on your picture. *(Hint: you will only be utilizing 3 out of the 4 forces at this point)*

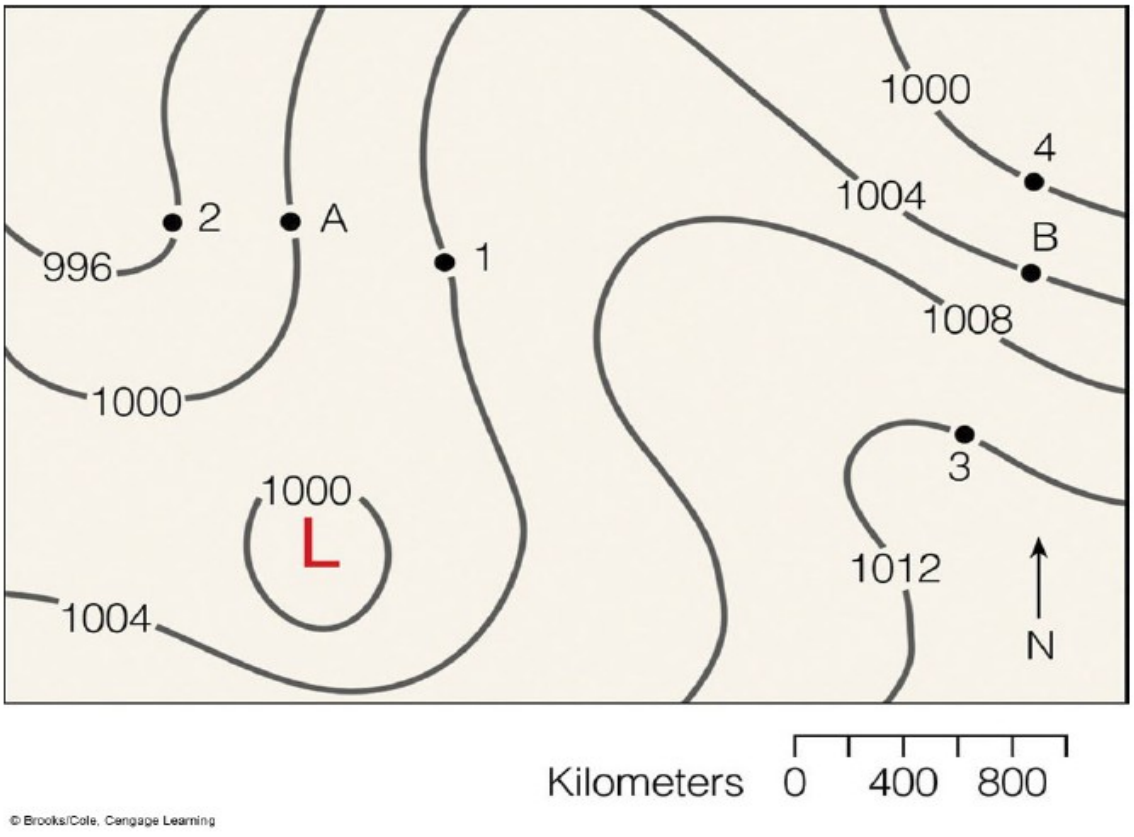




7) (1 point) Please draw the vectors for PGF, Coriolis force, and friction that are associated with *surface wind*.



8) (1 point) A sea-level pressure map is shown below where isobars are drawn every 4mb (Northern Hemisphere). Answer the following questions.



a) Place a dashed line through the ridge and a solid line through the trough.

b) What would be the wind direction at point A and at point B?

c) Where would the stronger wind be blowing, at point A or B? Explain.

d) Compute the pressure gradient between points 1 and 2 and between points 3 and 4.

9) (1 point) Draw and describe the type of vertical air motions associated with high and low pressure areas.

10) (1 point) Since there is always an upward-directed pressure gradient force, why doesn't the air rush off into space?