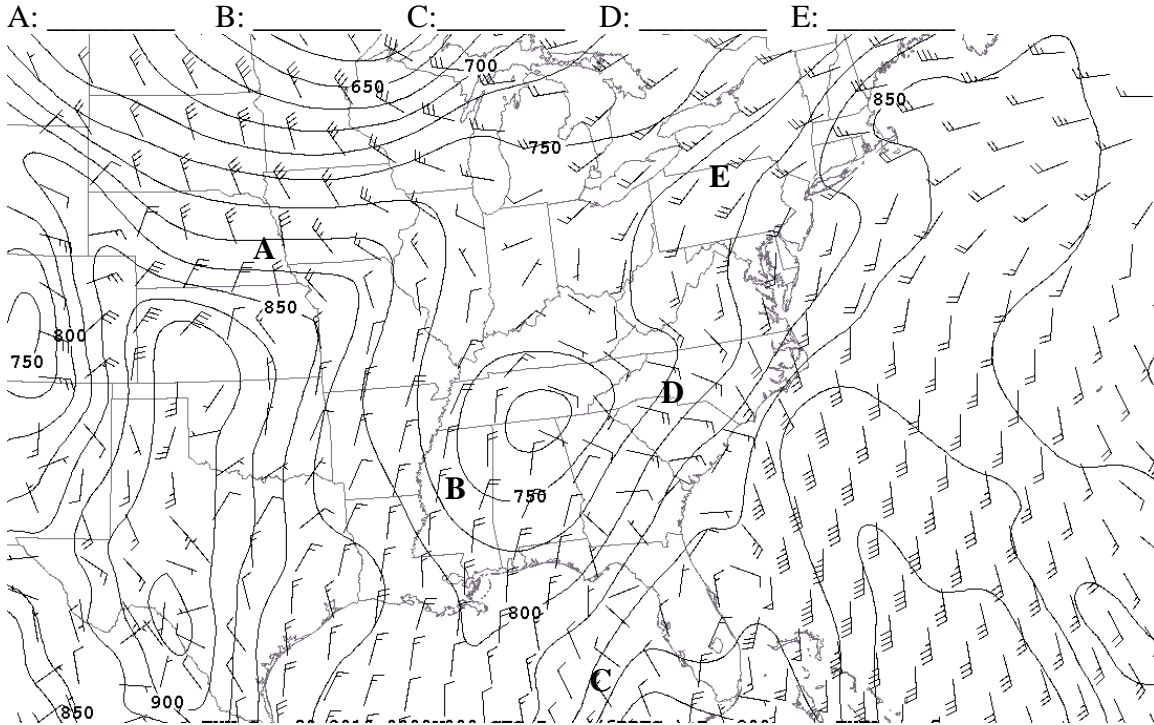


Name: _____

MEA 443 WEATHER ANALYSIS AND FORECASTING, Fall 2010
Quiz 6, 30 September 2010

1.) The plot below shows pressure and wind on the 304 K isentropic surface. For the points A-E listed below, assuming that the system speed is small relative to the wind speed, indicate the most likely vertical motion at each point (rising, sinking, or weak).



2.) Consider the METAR observations shown below. Use these to determine the following parameters *for the 30-h period ending 12 UTC today (9/30)*. Specify the units, and report values with as much precision as the original data allow.

Maximum Temp.: _____ Minimum Temp.: _____ Total Precip.: _____

During which 6-h period did the most rain fall? _____ How much? _____

KRDU 290551Z 0000KT 10SM BKN100 BKN200 19/16 A2985 RMK AO2 SLP104 T01940156 10222 20178 53012

KRDU 291151Z 03003KT 7SM -RA FEW006 SCT045 OVC080 18/16 A2988 RMK AO2 RAB36 SLP116 P0001 60027 70027 T01780161 10194 20178 53001

KRDU 291751Z 06007KT 8SM -RA OVC008 19/18 A2986 RMK AO2 SLP110 P0001 60008 T01940178 10200 20172 58008

KRDU 292351Z 05008KT 5SM RA BR BKN008 OVC024 20/18 A2980 RMK AO2 SLP088 CIG 006V011 P0016 60075 T02000183 10200 20194 55012

KRDU 300551Z 05012KT 4SM +RA BR FEW007 BKN032 OVC065 20/18 A2962 RMK AO2 SLP026 P0020 60077 T02000183 10206 20200 58038

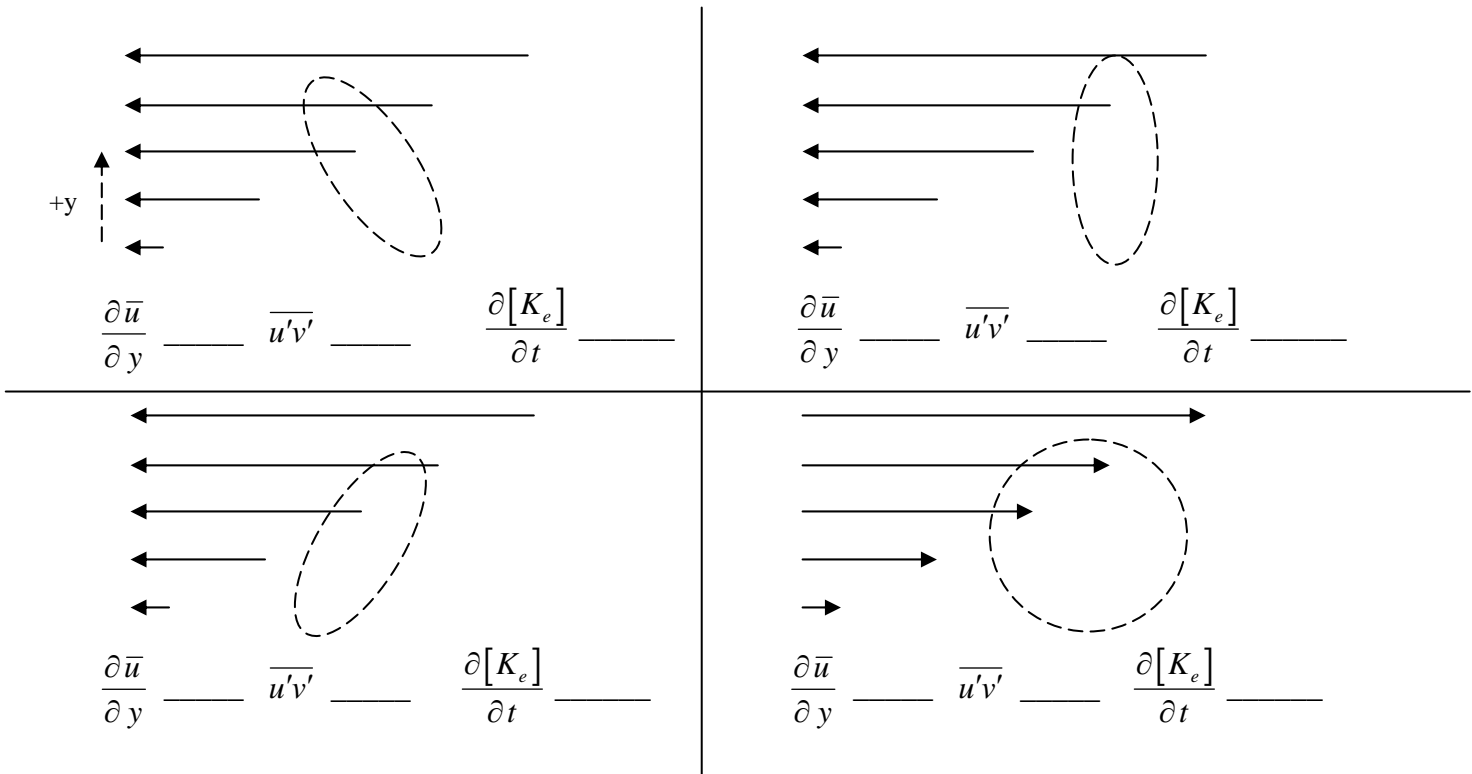
KRDU 301151Z COR 17011KT 10SM -RA OVC015 24/22 A2946 RMK AO2 PK WND 17027/1101 RAE08B50 SLP973 CIG 010V018 P0006 60158 70318 T02390217 10244 20200 55017

3.) The four idealized diagrams below show the zonally-averaged background flow, \bar{u} , as solid arrows. Superimposed on this are disturbances (eddies) shown by the dashed lines. Assume a Northern Hemisphere location and that each of the disturbances is cyclonic. The barotropic term of the QG energy equation is shown below.

$$\frac{\partial [K_e]}{\partial t} \underset{\text{barotropic}}{\propto} -\overline{u'v'} \frac{\partial \bar{u}}{\partial y}$$

a.) In each diagram, determine the sign ($>$, $<$, or $= 0$); indicate this in the space provided.

b.) If you were to form a “forecasting rule” for trough-axis tilt required for barotropic growth in this particular easterly flow regime, what would it be?



4.) True/False

- ___ a.) In the entrance region of a jet streak, the ageostrophic circulation is consistent with increasing kinetic energy.
- ___ b.) Averaged over a midlatitude cyclone, there is typically baroclinic energy growth.
- ___ c.) Thermally indirect circulations result in a lowering of the center of mass of the system.
- ___ d.) Negatively tilted troughs always strengthen from barotropic energy conversion.
- ___ e.) Near the center of the background jet stream, barotropic conversion is negligible.