Name: _____

MEA 443 WEATHER ANALYSIS AND FORECASTING, FALL 2011
Quiz 13, Thursday 12/1/2011

1.) Consider the north-south (meridional) advection of the zonal wind component $-v\frac{\partial u}{\partial y}$. Write this expression in "finite difference" form, such as would be needed in a numerical model.

2.) What specific condition must be met in order for a system of equations to be "closed"?

___ 3.) In parameterizing turbulence in models, one strategy is to add a new variable, the turbulent kinetic energy (TKE). How can a new variable be added to a model and still keep the system closed?

___ 4.) Which of the following best explains how models produce "simulated radar" plots?

a.) The vertical motion is considered, along with the humidity. If there is ascent and high humidity, the model comes up with a radar reflectivity that matches what a real radar would measure.
b.) The model looks at the rainfall forecast, the more rain produced by the model, the higher the "simulated reflectivity" value.
c.) The model actually predicts rain, snow, graupel and/or hail, and these hydrometeors are used to derive a "radar reflectivity factor" that mimics what real radars see.
d.) The model produces the simulated radar as a combination of the vertical motion, humidity, and the model rainfall forecast, a combination of a.) and b.) above.

___ 5.) Suppose that you are making a model precipitation forecast, and you note that a given region is forecast to have a large amount of "convective" precipitation from the model. Which of the following is the best forecast interpretation?

a.) The CP precipitation is not meant to be used in forecasting, and should be disregarded completely.
b.) The CP precipitation amount tends to be far too large and too localized, and should not be considered in the forecast.
c.) The CP precipitation is generally less reliable than grid-scale precipitation, but can still be useful in prediction of showery conditions.
d.) The CP precipitation tends to be less uniform in coverage than grid scale precipitation, so the coverage from the CP precipitation should be expanded to provide a more realistic forecast.

___ 6.) Which of the following are reasons why is it necessary for models to parameterize processes such as turbulence and cumulus convection?

a.) Because there are not enough detailed observations of these quantities to provide initial conditions for them.

b.) Because they are too small to be resolved on the model grid, but are sufficiently important that they must be accounted for anyway.

c.) Because if terms were included in the model equations to account for these processes, then the system of equations would no longer be closed.

d.) All of the above.

___ 7.) The "CFL" condition describes a relation between which of the following aspects of a numerical model?

a.) The PBL and convective parameterization schemes.

b.) The microphysics and the convective parameterization schemes

c.) The grid spacing, the time step, and the speed of waves in the model equations.

d.) The grid spacing and whether it is necessary to run with a convective parameterization scheme.

8.) List and briefly describe the two main classes of ensemble prediction system:

a.)

b.)

9.) Use the classifications above to characterize the:

a.) NCEP SREF: _____

b.) NCEP GFS EFS: _____

10.) What are the four main advantages of ensemble forecasting? List and briefly describe each.

a.)

b.)

c.)

d.)