5) Shade areas of high positive vorticity on the provided 500mb chart. Assume the winds are in geostrophic balance. Look for both shear and curvature vorticity. Also (using a different shade color) show the areas of maximum PVA (Positive Vorticity Advection).

See the "systems" lecture
http://wx.gmu.edu/dev/clim301/lectures/system/wx-systems.html

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6) On each of the provided maps of SLP and 1000-500mb Thickness, shade at least 10 enclosed "boxes" showing where the CAA (Cold Air Advection) is strongest. Also shade at least 10 enclosed "boxes" showing the stronger WAA (Warm Air Advection).

See Vasquez Page 70. Also see the lecture that discussed advection:
http://wx.gmu.edu/dev/clim301/lectures/wind/wind-grad.html

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7) Describe the top-down method for determining winter precipitation type.

See Vasquez Page 122.

Explain how the top-down method is used to determine the precipitation type for the Skew-T sounding for Dulles at 00Z Dec 9, 2013

The Skew-T sounding is at:
http://wx.gmu.edu/dev/clim301/case2/raob/IAD-09DEC2013-00Z.png

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8) Explain why model parameterization may lead to forecast errors.

See the lecture on numerical weather prediction
http://wx.gmu.edu/dev/clim301/lectures/models/nwp.html

Also follow the "Parameterization" link from the page
http://wx.gmu.edu/dev/clim301/lectures/models/links.html

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9) Describe what causes rising vertical motion in the atmopshere (Vasquez page 61). List and briefly describe at least three weather map features that indicate the potential for rising vertical motion.

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10) Explain what is indicated by a discontinuity in the level of the tropopause.

See Vasquez Page 64. Also see the lecture on weather systems
http://wx.gmu.edu/dev/clim301/lectures/system/wx-systems.html

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11) Use the Skew-T chart to answer the following questions for the Springfield MO (SGF) sounding for 12Z April 24, 2010. The sounding may be viewed at:
http://wx.gmu.edu/dev/clim301/lab7/skewt/skewt-SGF.png

a) Raise the surface parcel to its LCL. Give the pressure level and temperature at this point. From there, raise the parcel to the 500mb level. Give the temperature of the parcel at this point. Is the parcel buoyant at this point?

b) For the parcel in part a), determine the pressure levels of the LFC and EL.

c) Identify a likely cloud layer. Give a range of pressure levels for this layer.

d) Identify a stable layer. Give a range of pressure levels for this layer.

e) Identify a potentially unstable layer. Give a range of pressure levels for this layer.

f) Identify an inversion layer. Give a range of pressure levels for this layer.

See Vasquez Chapter 3. Also see the lectures on BB for the Skew-T. Also see the Wikipedia entry for LFC, and related links:
http://en.wikipedia.org/wiki/Level_of_free_convection

See attached sheet for Problem 12 (last problem).