**Atm 622 Fall 2012**

 **Problem Set #1**

**Note: Equation numbers refer to Holton (2004, 4th Edition)**

1. Prove that Holton (8.2) and (8.3) follow from first approximation through a scale analysis appropriate for middle latitude synoptic-scale motions.
2. Prove:

$$\left(\frac{∂}{∂t}+\vec{V}\_{ψ}∙∇\right)q=0$$

Where the quasi geostrophic potential vorticity, q, can be written as:

$$q= ∇^{2}ψ+f+f\_{0}^{2}\left(\frac{∂}{∂p}\right)\left(\frac{1}{σ}\frac{∂ψ}{∂p}\right)$$

1. Prove the following equations as they appear in Holton (2004):
2. 8.9
3. 8.10
4. 8.11