

## Homework Assignment - Atmospheric Soundings

Three atmospheric soundings from the first week of August, 2012, are included below. They come from three very different environments. For each sounding, please answer the following questions. (Note that questions 1-4 apply to all of the profiles, but for the latter questions, it may be that they only apply to certain soundings.) You will have to estimate values from the soundings: please just try your best “guesstimate” going for 1-2 significant figures, as you can. The goal is get a roughly approximate answer and show consistent calculations, not to get things perfect!

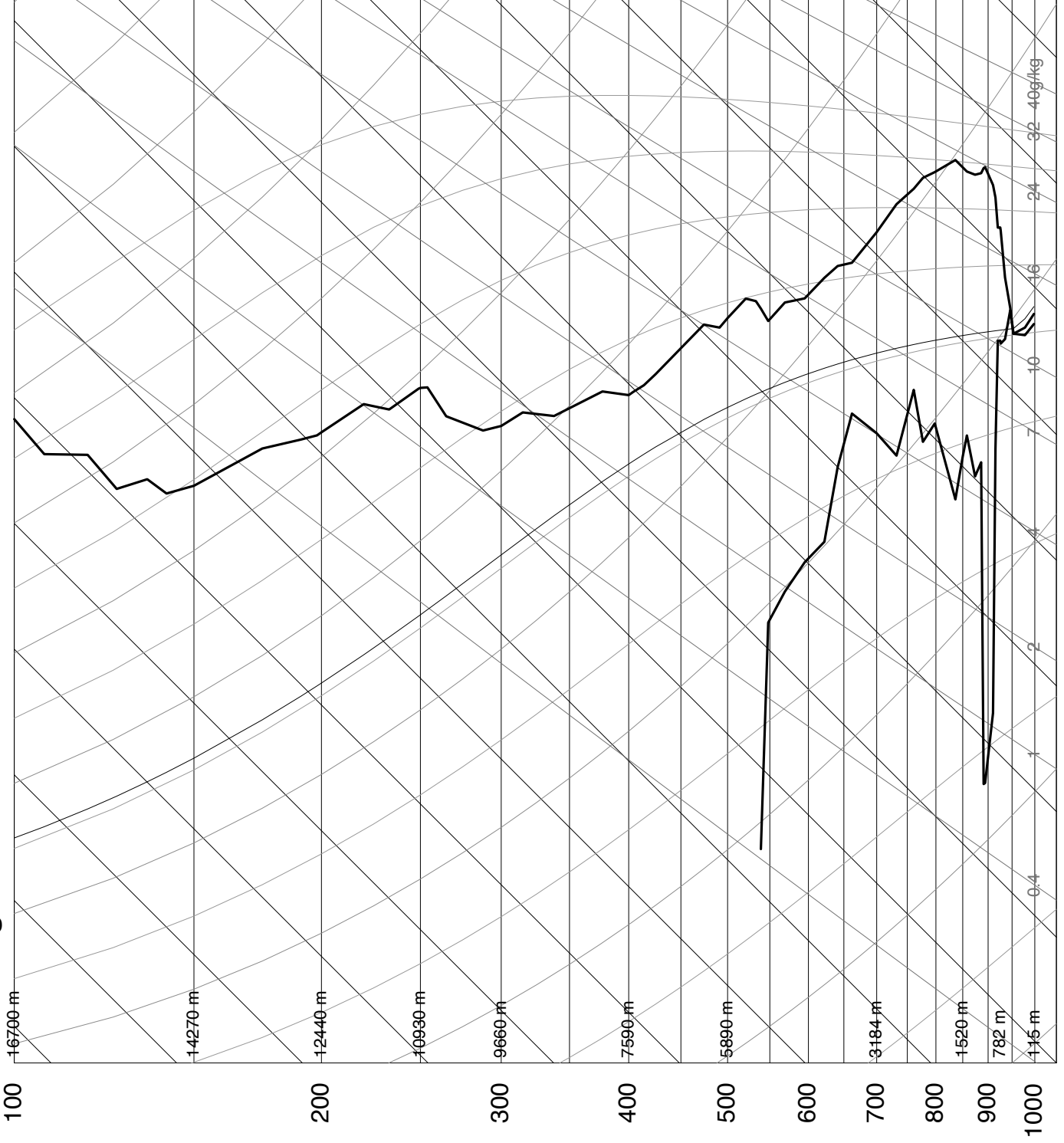
I've also posted an excerpt from *Atmospheric Thermodynamics* by Bohren and Albrecht to help you with these “skew T diagrams.” I encourage you to work in groups.

1. What are the surface (1000 hPa, or as close to it as you can get) values of:
  - a. temperature,  $T$
  - b. specific humidity,  $q$
  - c. saturation specific humidity,  $q^*$
  - d. relative humidity,  $U$
  - e. potential temperature,  $\theta$
  - f. moist potential temperature,  $\theta_e$ .
2. Now estimate the same values (a-f) at 500 hPa.
3. What is the height of the 500 hPa surface, and why is it moving around from sounding to sounding?
4. Estimate the tropopause height and pressure in each sounding.

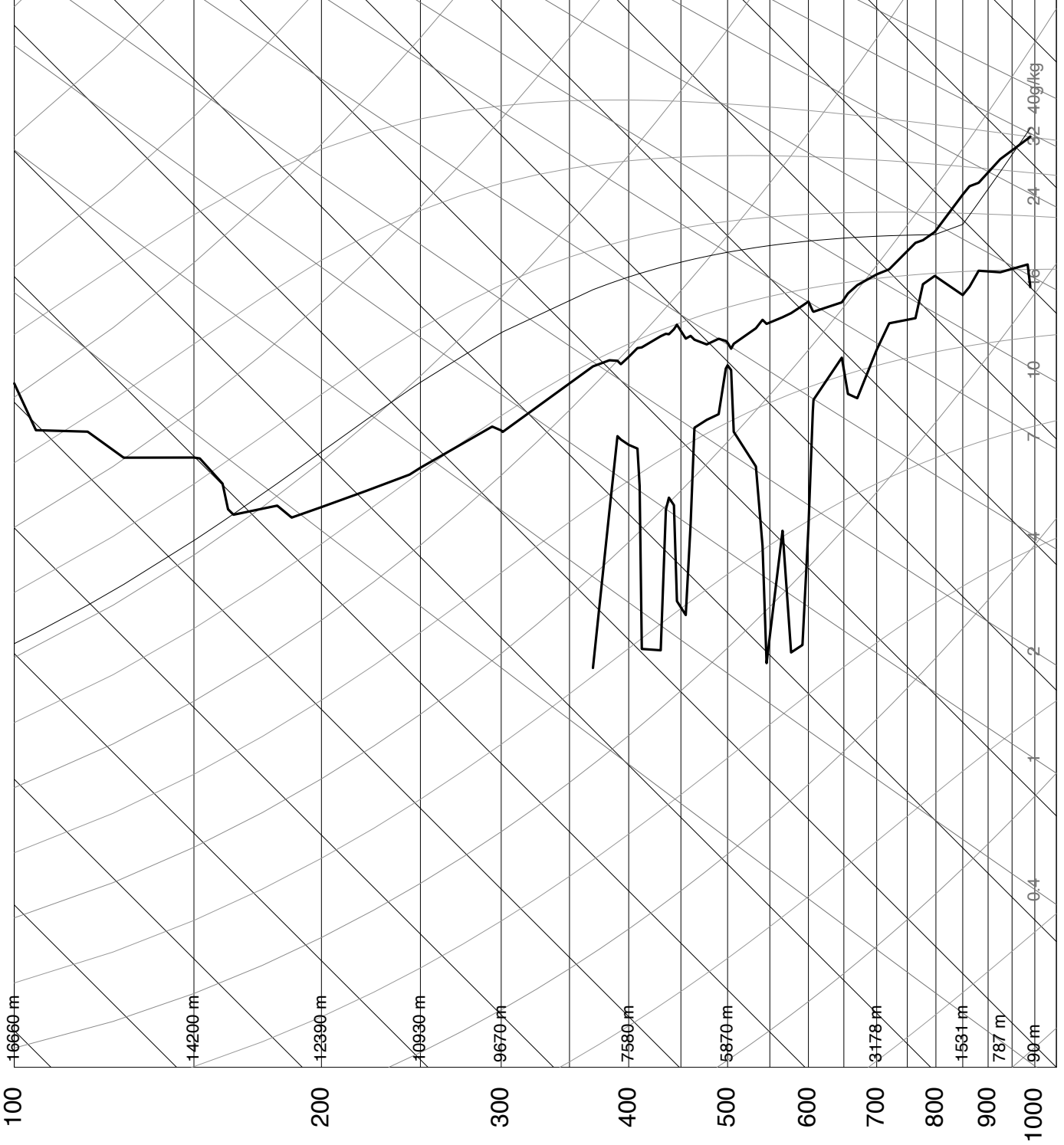
Hint: Questions 5-7 generally apply to one sounding, each.

5. Where (if anywhere) in the soundings does the atmosphere appear to be neutrally stable to dry convection? How high does it go?
6. Are any of the soundings conditionally unstable to moist convection? Is there anything inhibiting this convection in the lower troposphere? If convection started, how high could it go? What might prevent it from reaching this level?
7. Is there an inversion in any of the profiles? What is the height of the inversion, and how strong is it (i.e. how much warmer is that atmosphere above than below)? What is different about the air above and below the inversion?
8. Where (if anywhere) do you think there are clouds or fog in the soundings?
9. Please describe the meteorological conditions of each sounding. If you were a weather forecaster, would you be concerned? Or, to put it another way, if your wedding was at that location that day, what would you be worried about? (Alas, I don't think any of these locations would be that great for a wedding!)

# 72293 NKX San Diego

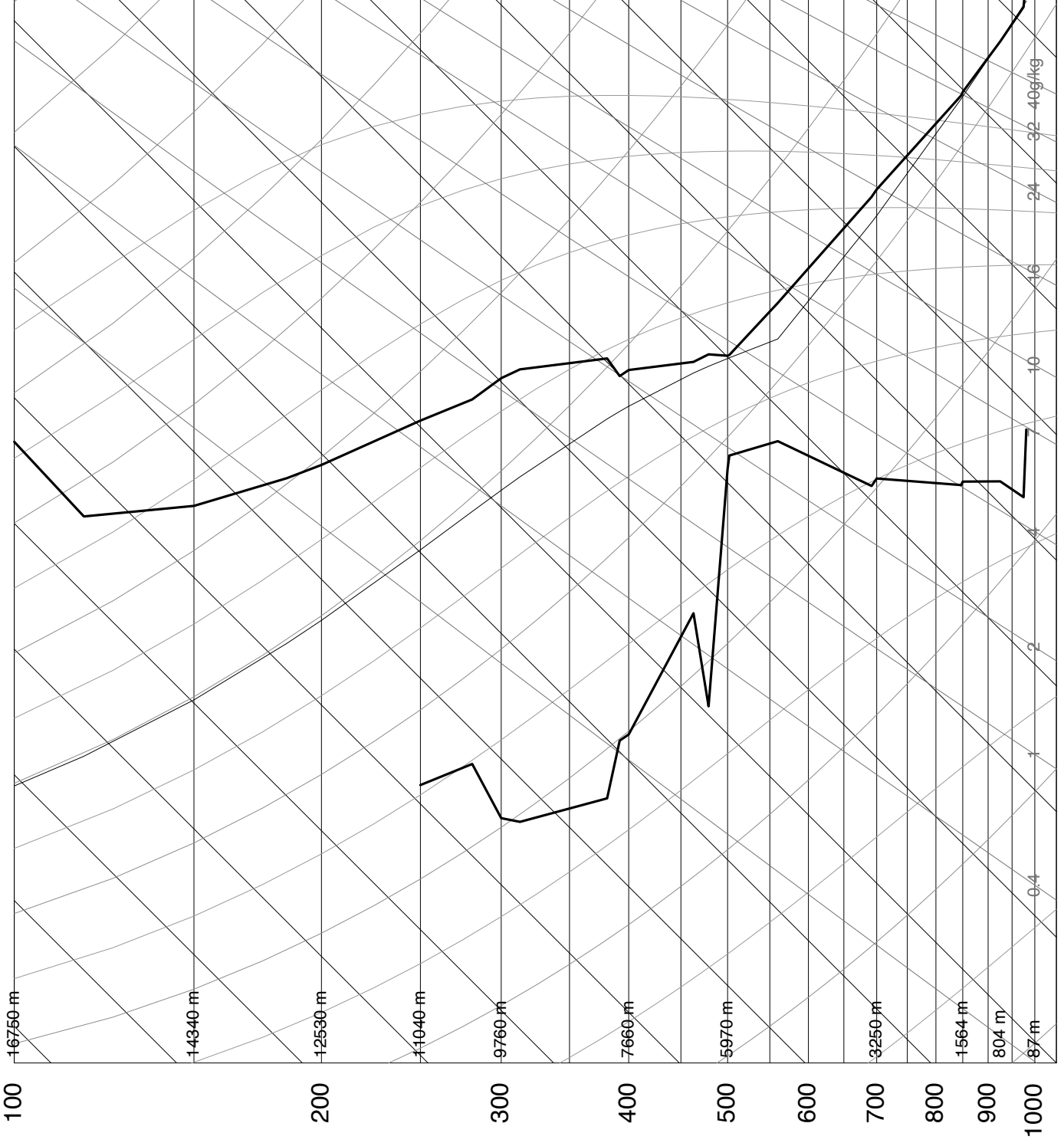


# 72327 BNA Nashville

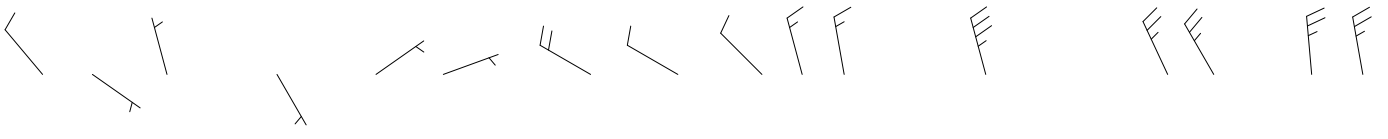


SLAT 36.25  
SLON -86.57  
SELV 180.0  
SHOW -3.91  
LIFT -7.24  
LFTV -7.83  
SWET 296.9  
KINX 38.50  
CTOT 22.50  
VTOT 30.50  
TOTL 53.00  
CAPE 2405.  
CAPV 2630.  
CINS -72.2  
CINV -51.3  
EQLV 163.8  
EQLV 163.8  
LFTV 790.9  
LFCV 803.5  
BRCH 142.8  
BRCV 156.1  
LCLT 291.3  
LCLP 835.8  
MLTH 306.7  
MLMR 16.06  
THCK 5780.  
PWAT 45.14

# 60630 In-Salah



SLAT 27.23  
SLON 2.50  
SELV 269.0  
SHOW 0.95  
LIFT 0.15  
LFTV -0.14  
SWET 82.01  
KINX 15.50  
CTOT 8.70  
VTOT 39.70  
TOTL 48.40  
CAPE 0.00  
CAPV 0.29  
CINS 0.00  
CINV -237.  
EQLV -9999  
EQLV 497.1  
LFCT -9999  
LFCV 503.1  
BRCH 0.00  
BRCV 0.07  
LCLT 268.2  
LCLP 557.5  
MLTH 316.9  
MLMR 4.83  
THCK 5883.  
PWAT 17.39



12Z 01 Aug 2012 University of Wyoming