

Professor: J.D. WilsonValue: 15%Due 15 Dec., 2005

**Instructions:** A maximum of one page per question will be marked. Your assignment need not be typed, but, tidiness and legibility will factor into your score.

You are permitted to work with others to perform this assignment, however, you are expected to hand in work that reflects your own reasoning, ordering and writing. As best you can, strive to make your responses creative, clear and interesting. State any assumptions or simplifications you make.

1. Suppose a  $1 \text{ m}^3$  parcel of air at the 850 mb level on the upwind side of the Rockies is saturated, with  $T_0 = T_{d0} = 11^\circ\text{C}$  but contains no liquid water or ice. If this parcel on traversing the Rockies is lifted adiabatically to a peak height of 725 mb, estimate its volume  $V_1$ , temperature  $T_1$  and dewpoint  $T_{d1}$  at that elevation, and the amount (mass) of liquid or solid water it contains, assuming none has been precipitated out of the parcel. Finally, assuming that this charge of water and ice is abruptly precipitated out before the parcel begins to descend from 725 mb, compute the parcel's volume, temperature, dewpoint and relative humidity ( $V_2, T_2, T_{d2}, RH_2$ ) upon descending adiabatically to the 850 mb level on the leeward side of the Rockies. (8%)
2. Today's public weather forecasts are based on guidance from numerical weather models, but even though they *could* be, they are *not* machine-produced. Based on your knowledge of the procedure, strengths and weaknesses of numerical weather prediction (eg. Chapter 13 and in particular the Chapter 13 Appendix on *Numerical Forecast Models*), write up to one page - **no more than 500 words** - defending (or criticizing, if you prefer) the proposition that “there remains a useful role for human intervention and interpretation in short range (say, 12-72 hours) weather forecasting”. **State** your word count. (7%)

Notes: In (1) show your reasoning and working. Make whatever unit conversions are necessary, and always show units in association with numbers. Use diagrams if appropriate and where they clarify your work. Orderly and comprehensible presentation of your answer is important; brevity and directness are also important, to which purpose you may use point form with abbreviations.

Question (2) asks that you digest the textbook information<sup>1</sup> (Ch. 13) on numerical weather prediction, along with whatever tips you have picked up from comments in class, and formulate a compact, well-founded and orderly line of argument. In regard to the latter, effective use of paragraphs usually helps; and don't forget that effective communication demands breaking a piece into: Introduction, Main, and Conclusion. Again, you must find a compromise between an exhaustive treatment (impossible in one tidy, legible page) and an overview.

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<sup>1</sup>We shall cover Ch. 13 and its Appendix (with exclusions as noted on the web) near the end of term, however since we have already encountered much of the material in map discussions, there is nothing to prevent you from simply reading the Chapter then beginning work on this task immediately. Supplementary diagrams that will appear in lectures on Ch. 13 material have already been loaded onto the web.