

## Homework–Module 3

Name:

- 1) “Drier with a chance of pouring rain” is the long-range outlook for Arizona. Research conducted at the UA<sup>1</sup> suggests that a warmer Arizona climate by the second half of the 21<sup>st</sup> century will likely feature less precipitation, but when precipitating storms do occur, they would come with an increased risk of flooding.

Use the concepts of the module 3 to explain how precipitation events in a climate that is 2°C warmer than today would be less likely but they more intense when they do occur. (Hint: use the saturation vapor pressure curve of Fig. 4.5 of Ahrens to support your answer.)



Lake Mead at record low-levels, spring 2016.  
Credit: [Time.com](http://Time.com)

- 2) What changes in the weather conditions near the earth’s surface and aloft are needed to transform an absolutely stable atmosphere into an absolutely unstable atmosphere? Consider the impact of changes in both the temperature and the moisture content of the air. For sake of brevity, ignore the impact of moisture changes aloft.

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<sup>1</sup> Dominguez F. and C.L. Castro, “Climate Projection: Drier with chance of pouring rain.” Arizona Daily Star. November 29, 2012.

- 3) On a winter night, the air temperature cooled to the dew point and fog formed. Before the formation of fog, the dew point remained constant. After the fog formed, the dew began to decrease slowly. Explain why using concepts in Chapter 4.
- 4) Everyday in the midst of summer heat, a blizzard occurs over the Great Plains. Explain where and why.
- 5) The air temperature during the night cools to the dew point in a deep layer, producing fog. Before the fog formed, the air temperature cooled at rate of  $2^{\circ}\text{C}$  per hour. After the fog formed, the air temperature cooled by only  $0.5^{\circ}\text{C}$  per hour. Give *two* reasons why the temperature cooled more slowly after the fog formed. (Hint: you will need to rely upon information content of module 1 to answer the question completely.)