

## 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 fewer precipitating storms, but when they 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 world 2°C warmer than today could be rarer but more intense and prone to produce floods. (Hint: use the saturation vapor pressure curve, Fig. 5.4 of H&P, to support your answer.) Each question has a 600-character limit.



*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 would be needed to change an absolutely stable atmosphere into a conditionally 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 that are not covered in our course.

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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 calm winter night, the air temperature cooled to the dew point and fog formed. Before the formation of fog, the dew point remained constant. But after the fog formed, the dew point began to decrease slowly. Explain why using concepts in Module 3.
- 4) 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 at a rate of  $0.5^{\circ}\text{C}$  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.)