

## Homework–Module 1

Name:

- 1) Warning signs such as the one to the right are common before bridges. And they are put there for good reason.

Why does the bridge get icy before the pavement on the ground when air temperatures drop below freezing? Use heat transfer concepts to explain your answer. Assume calm winds to simplify the discussion.

There is a 600-character limit for all questions.



- 2) One of my most humbling experiences as a fledgling meteorologist (a.k.a. early learning experiences) occurred for Corvallis, Oregon during the winter of 1979-80. I forecast clear, calm conditions overnight and a low near freezing ( $33^{\circ}\text{F}$ ). It was indeed calm all night with cold air trapped in the Willamette Valley. And it was clear too...most of the night. Unfortunately for my forecast, low-clouds (stratocumulus) began to drift overhead after midnight, at which time the temperature warmed to  $45^{\circ}\text{F}$  and stayed there through the rest of the night. My forecast low ended up  $8^{\circ}\text{F}$  too cold, a major bust!

Use heat transfer concepts to explain why the surface temperature increased as the low clouds moved overhead.

(Hint: infer from Figs. 2.12 and 2.18 of textbook the impact of clouds on radiative heat transfer.)