

Name: _____

Quiz Section: _____

ATMS 101
Autumn 2013

Homework #4

Due: Thursday, November 21, 2013 at the **beginning** of class

Please show all your work.

#1. Use Wien's Law $\lambda_{max} = \frac{c}{T}$, where $c = 2892 \mu m \cdot K$, to answer the following:

(a) The surface temperature on Mercury is $533 K$. At what wavelength does Mercury emit the maximum intensity of radiation?

(b) The wavelength of maximum emitted intensity for Jupiter's atmosphere is $16.72 \mu m$. What is the temperature of Jupiter's atmosphere?

#2. A blackbody warms from $250 K$ to $300 K$ and the amount of radiation it emits changes from R_{250} to R_{300} . What is the ratio R_{300}/R_{250} ? Use the Stefan-Boltzmann Law $R = cT^4$, where c is a constant.

#3. In an attempt to reduce fossil fuel emissions, a new fuel is developed for cars. When used in engines, this new fuel produces a gas that absorbs strongly in the infrared “atmospheric window” from 8 to $12\mu m$. How would this affect the Earth’s climate?

#4. Why must atmospheric scientists consider apparent forces (i.e. the Coriolis and centrifugal forces) when trying to predict the weather?

#5. On a clear day, you notice that you can see objects that are very far away, far beyond the usual horizon. You also notice that some objects appear much higher than normal. What can you deduce about the vertical temperature structure of the lower atmosphere? Explain.
