PHYSICS OF CLIMATE
PROBLEMS-2

Due: 30 Sepetember 2015

You should work on this in your "science team" groups. However, you are also welcome (in fact encouraged) to consult with others (as well as me) if you have difficulty working on these. Please turn in your team's work via email to gutowski@iastate.edu. To help me spot it in my Inbox, please have the subject line read:
Subject: Climate Modeling, Problem Set 2

1. You recently computed radiative temperatures for several planets. Again, for this calculation, it is important to note that the intensity of radiation from the sun decreases with the *square* of distance from the sun. At the orbit of the earth (1 Astronomical Unit from the sun), assume the solar energy flux = 1360 W-m^{-2}. For the earth's albedo, radiative balance led to an average outgoing flux of 238 W-m^{-2} and a radiative temperature of 255 K.

Let's revisit two of these planets, Venus and Mars:

Planet	**Distance from sun [A.U.]**	**Albedo**	**Surface temperature [˚C]**	**Emissivity, ε**	**Climate sensitivity, β [˚C]**
Venus	0.72	0.76	+ 482.		
Mars	1.52	0.16	- 63.		

Using some of your results from Problem Set 1, you can compute the emissivity, ε, of the planet, under the assumption that it behaves like an equivalent black body. Why is ε smaller for Venus than for Mars?

Then, assume also that albedo is constant, and compute the climate sensitivity, β. Which planet is more sensitive to changes in solar radiation under these assumptions?