

Homework 7, Math 450, Spring 2018

Instruction: Answer each of the following questions, showing and explaining your work as you go. Partial credit will be awarded based on how well I can follow your work and how far you get, so please use sentences, description, diagrams, and clear definitions to communicate your results as best you can. All diagrams and plots should be labelled, for example.

1. Predicting Martian climate
 - a. What data would you need to predict the average temperature of Mars?
 - b. Where can you find this data on the internet? (Please choose a source or sources that are trusted and have a verifiable citation.)
 - c. Using the methods from class, predict the average temperature on Mars.
 - d. The Viking 1 lander recorder that actual temperature on Mars (<http://www-k12.atmos.washington.edu/k12/mars/data/vl1/part1.html>). Plot the actual temperature over 10 sols (a Martian day), and discuss the relationship between the predicted and observed values.
2. In our class calculations to predict the earth's global average temperature, we ignored power entering the atmosphere from the light bouncing off the moon. Estimate the total moonlight power reaching earth relative to the total direct solar power reaching earth.
3. If we want to build a ringworld in our solar system that has an average climate of 295 degrees Kelvin and an albedo 30 %, what should the ringworld's radius be (in astronomical units)? You can assume the outer sides of the ringworld are perfectly insulated and do not lose heat.