

AST 301
Homework #10
Due Friday April 22

1. I've drawn below two pictures of a very small 'Universe'.
The second picture was taken 1 second after the first, and the Universe has expanded during that second. Imagine you are on one of the stars in this Universe.

- a) Measure the distance from your star to each of the other stars in the first picture. (You could cut off and use my dots at the bottom of the page as a ruler.)
- b) Measure the distance from your star to each of the other stars in the second picture, one second later.
- c) Since speed is distance traveled divided by the time spent, the speed of each of the stars away from you is the difference between its distance from you in the second picture and its distance from you in the first picture, divided by 1 second. Calculate the speed of each of the stars.
- d) Make a Hubble diagram of this Universe, that is a diagram showing the speeds and distances of each of the stars moving away from your star.
Is Hubble's law valid? That is, is speed proportional to distance?
- e) Calculate the Hubble constant for this Universe.
- f) Find someone in the class who assumed he or she was observing the expansion of the Universe from a different star from yours. Write down his or her name and the Hubble constant he or she measured. (Several people would be better.) Is the Hubble constant the same measured from any star in the Universe?
- g) What is the age of this Universe?

