1. Suppose you construct a scale model of the Solar System from the Sun to Neptune. You place the Sun in Byrd Stadium and Neptune in the Comcast Center. On that scale, how large would the Sun be (diameter)? How about the Earth? Show all your calculations.

2. Explain, in at most a few sentences, how we can determine the composition of distant stars and nebulae without having samples to examine.

3. Suppose that all stars evolved completely quietly, in the sense that they never lost any of their original mass to stellar winds, supernovae, or any other process. Discuss the effect this would have on the formation of terrestrial planets and on the emergence of life.

4. A maverick scientist, Dr. I. M. N. Sane, has announced to the press that life was possible much earlier than establishment scientists realize. He notes that some theories suggest that black holes close to the mass of our Sun might have been formed a small fraction of a second after the Big Bang [it is true that this has been suggested]. He argues that terrestrial planets would have formed around such black holes, from abient gas, no more than five million years after the Big Bang. Life on these planets would then be old and wise and able to counsel us in our time of need. You have been asked for your comment. What do you say? **Note:** read the class notes for some background.

5. Suppose that the Earth had half its actual volume, and also half its actual mass. Discuss two consequences of this that might have made it more difficult for complex life to evolve.