Finishing reading Chapter 18. These problems are from that chapter. Although this homework is due a week after the midterm exam, you may want to work on it early to help you prepare for the exam.

29. If you looked at the spectrum of a reflection nebula, would you see absorption lines, emission lines, or no lines? Explain your answer. As part of your explanation, describe how the spectrum demonstrates that the light was reflected from nearby stars.

31. The visible-light photograph below shows the Trifid Nebula in the constellation Sagittarius. Label the following features on this photograph: (a) reflection nebulae (and the star or stars whose light is being reflected); (b) dark nebulae; (c) H II regions; (d) regions where star formation may be occurring. Explain how you identified each feature.

34. The two false-color images below show a portion of the Trifid Nebula (see Question 31). The reddish-orange view is a false-color infrared image, while the bluish picture (shown to the same scale) was made with visible light. Explain why the dark streaks in the visible-light image appear bright in the infrared image.

35. At one stage during its birth, the protosun had a luminosity of 1000 $L_\odot$ and a surface temperature of about 1000 K. At this time, what was its radius? Express your answer in three ways: as a multiple of the Sun's present-day radius, in kilometers, and in astronomical units.

36. A newly formed protostar and a red giant are both located in the same region on the H-R diagram. Explain how you could distinguish between these two.

37. (a) Determine the radius of the circumstellar accretion disk in Figure 18-15. (You will need to measure this image with a ruler. Note the scale bar in this figure.) Give your answer in astronomical units and in kilometers. (b) Assume that the young star at the center of this disk has a mass of 1 $M_\odot$. What is the orbital period (in years) of a particle at the outer edge of the disk? (c) Using your ruler again, determine the length of the jet that extends to the right of the circumstellar disk in Figure 18-15. At a speed of 200 km/s, how long does it take gas to traverse the entire visible length of the jet?