ASTR 302

Homework 1: Due January 29, 2024, 10AM

You are welcome to use any resources available to you, and are free to discuss the homework with other students. Collaborative studying is encouraged, but the write-up you turn in should be your own. Please neatly write or type your results, showing your work and/or justifying your answers with equations (i.e. don't just use your computer to calculate the answer and then only give the result).

Recommended reading: *Observational Astronomy, Chapters 1, 2, and 5*

1) You measure a circumpolar star to have an altitude of 49°38'±2' at upper transit and an altitude of 18°21'±2' at lower transit. Ignore the effects of atmospheric refraction.
    a. What is the latitude of the observer?
    b. What is the declination of the star?

2) You have been given telescope time on the night of Jan 18, 2024 (local time) at the 61" telescope on Mt. Bigelow to observe the exoplanet system Upsilon Andromeda (Ups And). Carry out the following calculations either by hand or by writing a short computer program in the language of your choice.
    a. What is the Local Sidereal Time when Ups And transits the meridian?
    b. What is the corresponding local time?
    c. What is the corresponding Julian Date?
    d. You want to observe Ups And from Hour Angle = -2 to +2. What time do you need to start the observation, and will the sun be sufficiently below the horizon?

3) Use SkyView (https://skyview.gsfc.nasa.gov/current/cgi/query.pl) to generate images of Barnard's Star 0.25° across in the DSS2 Blue, DSS2 Red, DSS2 IR, and 2MASS-H bands. What do you observe? Describe in words how you would use one or more of these images as a finder chart to locate the star for an observing run on June 1 2024. Annotate the image to identify the star location.

4) A catalog lists the V magnitude of a star as 4.95. You measure a nearby star to be 32.9 times fainter.
    a. What is the nearby star's magnitude?
    b. What is the photon flux in V for each star?