HOMEWORK #4
Due date: Sep 23, 2020

1. Choose your favorite star (or a random star if you don't have a favorite one yet) – it can't be the same as anyone else's – and write down its equatorial coordinates. Find the day of the year when your star culminates at 8pm, observing from your home town. Look up and write down geographic coordinates rounded to the nearest second of arc. Then calculate the refraction-corrected altitude and azimuth, and apparent right ascension and declination.

2. Say you need an additional 15 minutes to complete this assignment, but you are worried that, due to weather, you'll lose power and you won't be able to see. At what latitude should you go today to gain those 15 minutes of daytime due to refraction?

3. Let's generalize the previous answer. How much longer is daylight due to refraction, and how does that depend on date and geographic latitude?

4. Show that the Sun is the shape of an ellipse if you assume a simple refraction law ($R = k \tan \zeta$).

5. Re-do problem #2 from Homework #3, but this time take atmospheric refraction into account.

6. *Extra credit:* I challenge you to a programming contest: write a program that will provide atmosphere-corrected alt-az and equatorial coordinates for a non-circumpolar star of choice from starrise to starset.