

## **Astronomy 205:**

### **Assignment 4: Due March 12 2018 before class in ASTR205 Box outside Henn 312 Exploring the Properties of an Open Star Cluster**

This assignment is an exploration of an open star cluster. There are 4 files that you will need to complete this project and they are all on the web site. Make lots of plots (as requested) so that we can follow what you are doing.

1. Use the file **clusterUBV.txt** to plot the V, (B-V) colour-magnitude diagram of the cluster. Use this diagram to estimate the binary frequency in the cluster.
2. Use the same data set to plot the colour-colour diagram. Determine the reddening and extinction to the cluster by using the file **UBV\_intrinsic\_colour.txt**.
3. Replot the cluster CMD in the de-reddened colour and extinction-corrected magnitude.
4. Determine the distance to the cluster by plotting and shifting the fiducial main sequence found in the file **UBV\_intrinsic\_ms.txt** until it aligns with the cluster main sequence.
5. Obtain an estimate of the age of the cluster by overplotting the isochrones in the files (**isochrone\_3.16e7yrs.txt –  $3.16 \times 10^7$  years; isochrone\_1.00e8yrs.txt –  $10^8$  years, and isochrone\_316e8yrs.txt –  $3.16 \times 10^8$  years**) onto the cluster main sequence and deciding which one fits the turnoff region the best. Note that the isochrones already include the correct extinction so all you need to add to these magnitudes is the distance modulus EXCLUDING the extinction and then add the reddening to the colour.
6. The youngest isochrone does not fit the lower main sequence very well. Can you suggest why?
7. How does the age of this cluster compare to that of the dinosaurs? Did any dinosaurs live BEFORE the cluster formed?
8. Can you think of anything else to do with these data?