

The data file snlist.txt <http://homework.uoregon.edu/pub/elsa/snlist.txt> lists all supernovae reported since 1885 through November 2014. It also contains basic information about the properties of the supernova and host galaxy (the galaxy where the supernova exploded).

Briefly, the columns are:

- Supernova name
- Host galaxy name
- Sky coordinates of the supernova measured in hours minutes seconds. There are six columns; the first three describe the **right ascension (RA)** position and the second set of three describe the **declination (Dec)**.
- Columns **HRV** and **Z** are distance measurements to the supernova in two different unit systems
- **Bmag** is the brightness of the host galaxy measured in blue magnitudes (smaller the number the brighter the object)
- **LogD25** is a logarithmic measurement of the apparent diameter of the galaxy
- **MaxMag** is the brightness of the supernova at its absolute peak
- **Type** is the supernova type (e.g. Ia, II, etc)
- **Disc** is the discoverer.

It's not important that you fully understand what each column means. More information will be given if/as needed and you can always google for more info. Missing numerical data is substituted with 99s or 99999 depending on the quantity. Missing character data is simply blank.

Instructions: Using any programming language(s) of your choice (e.g. Matlab, Python, Linux commands, R or any programming language **EXCEPT** Excel or other spreadsheets, do the following tasks. **Present your answers as scripts to generate the output or plot. Also show the first and last 10 lines of the output or plot.**

- 1) Extract out the Galaxy and **HRV** columns.
- 2) Extract out rows that contain only NGC galaxies.
- 3) Plot z vs MaxMag
- 4) Plot the supernova position in units of degrees. RA is the horizontal coordinate ranging from 0 to 360 degrees and Dec ranges from -90 to 90. The conversion formulas are:

$$\text{RA (deg)} = 15 * (\text{H} + \text{M}/60 + \text{S}/3600)$$

$$\text{Dec (deg)} = (\text{D} + \text{M}/60 + \text{S}/3600) * (-1 \text{ if D is negative or } +1 \text{ if D is positive})$$

For example 1885A has the coordinates: 00 42 44 +41 16 08

$$\text{RA} = 15 * (00 + 46/60 + 44/3600) = 11.68$$

$$\text{Dec} = (41 + 16/60 + 8/3600) * (+1) = 41.269$$

- 5) Plot the positions of only Ia and Ia subtypes (e.g. Ia pec etc)