COMP1200 - Fall, 2011

The following problem will be approached in phases in multiple assignments. You will need to restrain yourself and only complete the requirements for the current assignment. The sequence of assignments is designed to introduce new MATLAB skills and statements gradually.

The Big Bang --- An Observational Study

Edwin Hubble used the Mount Wilson Observatory telescopes to measure features of nebulae outside the Milky Way. He found that there is a relationship between a nebula's distance from earth and the velocity with which it was traveling from the earth. Hubble's initial data on 24 nebula is presented in Table 1 below and stored in hubbleData.txt (Hubble, 1929).

The relationship between distance and velocity led scientists to propose that the universe came into being with a Big Bang, a long time ago. If material scattered from the point of the Big Bang traveling at a constant velocity, the distance traveled can be determined.

Table 1. Nebulae Whose Distances Have Been Estimated From Stars Involved Or From Mean Luminosities In A Cluster

object	ms	r	v	mt	Mt
S. Mag.	..	0.032	+ 170	1.5	-16.0
L. Mag.	..	0.034	+ 290	0.5	17.2
NGC6822	..	0.214	- 130	9.0	12.7
NGC 598	..	0.263	- 70	7.0	15.1
NGC 221	..	0.275	- 185	8.8	13.4
NGC 224	..	0.275	- 220	5.0	17.2
NGC 5457	17.0	0.45	+ 200	9.9	13.3
NGC 4736	17.3	0.5	+ 290	8.4	15.1
NGC 5194	17.3	0.5	+ 270	7.4	16.1
NGC 4449	17.8	0.63	+ 200	9.5	14.5
NGC 4214	18.3	0.8	+ 300	11.3	13.2
NGC 3031	18.5	0.9	- 30	8.3	16.4
NGC 3627	18.5	0.9	+ 650	9.1	15.7
NGC 4826	18.5	0.9	+ 150	9.0	15.7
NGC 5236	18.5	0.9	+ 500	10.4	14.4
NGC 1068	18.7	1.0	+ 920	9.1	15.9
NGC 5055	19.0	1.1	+ 450	9.6	15.6
NGC 7331	19.0	1.1	+ 500	10.4	14.8
NGC 4258	19.5	1.4	+ 500	8.7	17.0
NGC 4151	20.0	1.7	+ 960	12.0	14.2
NGC 4382	..	2.0	+ 500	10.0	16.5
NGC 4472	..	2.0	+ 850	8.8	17.7
NGC 4486	..	2.0	+ 800	9.7	16.8
NGC 4649	..	2.0	+1090	9.5	17.0

Mean					-15.5

ms - photographic magnitude of brightest stars involved
r - distance in units of 106 parsecs.
The first two are Shapley's values.
v - measured velocities in km/sec
N. G. C. 6822, 221, 224 and 5457 are recent determinations by Humason.
mt - Holetschek's visual magnitude as corrected by Hopmann.
The first three objects were not measured by Holetschek,
and the values of mt represent estimates by the author
based upon such data as are available.
Mt - total visual absolute magnitude computed from mt and r.

Hubble, Edwin. (1929) "*Relation Between Distance And Radial Velocity Among Extra-galactic Nebulae*," Proceedings of the National Academy of Science 15: 168-73. Accessed at http://apod.nasa.gov/diamond_jubilee/ d_1996/hub_1929.html on October 9, 2011.