

Homework #1 – ASEN 5050

Due: Tuesday, 9/1/2015

Answer the following questions using the [Heavens-Above](http://www.heavens-above.com/) web page. The URL is: <http://www.heavens-above.com/>. You may want to register yourself with the website – it's free!

Before doing anything else, change your “observing location” to Boulder, Colorado!

1. Use the Heavens-Above service to compute the overflights of the International Space Station for the next 10 days.
 - a. **(5 pts)** What orbit is the ISS in? You'll find this toward the top of the “ISS” page.
 - b. **(10 pts)** How many *visible* overflights are there in the next 10 days? For the *visible* overflight with the *highest maximum elevation* in the sky, report the azimuth, elevation, and time (MDT) of the starting and ending points of the pass.
 - c. **(5 pts)** You might have noticed that September's *visible* overflights are mostly in the early morning, for observers in Boulder. Start searching for the next visible overflight of the ISS that occurs in the evening, starting in September. Report the same information about this next evening visible overflight.

Now go put it on your calendar to watch. Though, I'd suggest viewing the 10/4 overflight!

Also, be sure to take a look at *All* overflights to see when the ISS is overhead, just for kicks.

2. **(10 pts)** Compute the time and sky location for the brightest "Iridium Flare" over Boulder during the next 7 days. For the brightest flare (smallest magnitude in the 2nd column), report the time (MDT), azimuth, elevation, Iridium satellite number, and magnitude.

(20 pts) Provide a short description of what Iridium Flares are and what causes them.

3. **(20 pts)** Compute the Boulder overflights for the "brightest satellites" (magnitude 3.5 and brighter) for any early morning or evening (tonight? If it's cloudy, keep trying!). When did you try? When did you succeed? Attempt to find one of these bright satellites in the sky using the overflight times, azimuths, and elevations, and report any success you have.
4. **(10 pts)** Which satellites are departing the Solar System?

Take note: this is what the page looked like 2 years ago. Take a look at how fast these satellites are departing!

	Pioneer 10	Pioneer 11	Voyager 2	Voyager 1	New Horizons
Distance from Sun (AU)	109.108	88.672	102.545	125.241	27.292
Speed relative to Sun (km/s)	12.021	11.353	15.419	17.031	15.018
Speed relative to Sun (AU/year)	2.536	2.395	3.253	3.593	3.168
Ecliptic latitude	3°	14°	-35°	35°	2°
Declination	25° 57'	-8° 42'	-56° 33'	12° 17'	-21° 7'
Right ascension	5 ^h 10 ^m	18 ^h 44 ^m	19 ^h 51 ^m	17 ^h 9 ^m	18 ^h 45 ^m
Constellation	Taurus	Scutum	Telescopium	Ophiuchus	Sagittarius
Distance from Earth (AU)	109.364	88.076	101.961	125.082	26.678
One-way light time (hours)	15.16	12.21	14.13	17.34	3.70
Brightness of Sun from spacecraft (mag)	-16.5	-17.0	-16.6	-16.2	-19.5
Spacecraft still functioning?	no	no	yes	yes	yes
Launch date	03/03/1972	06/04/1973	20/08/1977	05/09/1977	19/01/2006

5. **(20 pts)** On the day that you attempted (and succeeded!?) to make satellite observations, compute the times of sunrise and sunset. In addition, compute the rise and set times for the moon, and the percent illumination of the lunar disk.