Adam Gincel

PEP151

*I pledge my honor that I have abided by the Stevens Honor System*.

Homework 2

1)

a) The celestial North Pole is indicated by the star Polaris.

b) 90 – 23.5 = 66.5 degrees at noon. It is -66.5 degrees away at midnight.

c) It would be 90 degrees at noon, and -90 degrees at midnight.

2)

a) The north celestial pole is 90 degrees away.

b) The sun would be 0 degrees away at noon, and on the exact opposite side of earth at midnight.

c) The sun would be 23.5 degrees away at noon, and -23.5 degrees away at midnight. They are different because the ecliptic plane and the equatorial plane are not parallel.

d) The sun would be -23.5 away at noon and 23.5 away at midnight. This would be the same for spring and autumn.

3)

a) 40.3364 degrees

b) 90 – 40.3364 = 49.6636 degrees

c) 40.3364-23.5 = 16.8364 degrees

d) Equinox is just 40.3364, and Winter Solstice = 40.3364 + 23.5 = 63.8364 degrees

4)

a) The length of a day on the equator is always 12 hours.

b) In my hometown (40.336, -74.433), The longest day is 15 hours and 3 minutes long, and the shortest day is 9 hours and 18 minutes long.

c) Our solar noon on the date of this writing is at 11:44:07. It is not exactly 12pm because the sun’s ecliptic path is not parallel with the celestial equator.

d) The longest day is 22 hours and 7 minutes, and the shortest day is 4 hours and 7 minutes long. Wow.

5)

If the moon was twice the distance it currently is from the sun, total eclipses would no longer be possible. Total eclipses are only possible because the moon and the sun just so happen to appear as the same approximate size, thanks to the ratio of their relative distance and relative size being roughly equivalent. Increase the moon’s distance, and it takes up much less space in the sky, rendering total eclipse impossible. Despite this, partial eclipses and annular eclipses, wherein the moon is in front of the sun and either blocking part of, or is encircled by, the sun, are still completely possible.

6)

a) There are approximately 10.875 more days in the solar calendar than the lunar calendar.

b) In 19 years this accumulates to 206.62729 days.

c) The difference is 6.99, or approximately 7 synodic months.

d) 12 solar years have 235 synodic months, as opposed to 228 solar months.