Physics 10293 Lab #2:
Learning Starry Night, Part 1

Introduction

In this lab, we'll learn how to use the Starry Night software to explore the sky, and at the same time, you'll get a preview of many of the topics that will be covered in lecture and lab this semester. Starry Night has a large number of features and options, and we will learn about some of the most useful ones for our purposes.

Using the Skyguide

First, start up the program. When the program first starts up, you may be asked to update data or the software. Just hit "later" for these and ignore them. TCU is responsible for keeping the software updated, so we don't need to worry about it. You will need to tell it where you are viewing from, which should be Fort Worth. The tutorial we will work through can help you with this.

When you open the application, the left sidebar will likely be open to the SkyGuide. If it is not, type "Skyguide" into the search box in the upper right corner and follow the instructions that appear. We are going to walk through the Tutorial in this lab, so click on that link. It should open a pane on the left side of the application labeled "Tutorial".

Occasionally, to check your understanding, the Skyguide will ask a multiple choice question. The same questions appear on your worksheet for this lab, and you should answer them as you go along.

In "2: The Toolbar - Cursor Tools"

Q1. How far away from Earth is Antares? _____ light years.

Q2. What is the approximate angular separation between the star Antares and the Moon? _____ degrees.

In "3: The Toolbar - Time and Date Controls"

Q3. On the date July 5, 2009, what is the approximate angular separation between the star Antares and the Moon? _____ degrees

In "4: The Toolbar - Time Flow Controls"
Q4. Write below the statement in question 5 that is INCORRECT.

_____

_____

In "7: The Toolbar - Gaze"
Be sure to close to right-hand-side search pane so you can see correctly where the center of the view is when you are scrolling across the sky. The gaze display only shows the altitude and azimuth of your gaze while you are "grabbing the sky" and changing your viewing direction.

Q5. What compass direction corresponds to an Azimuth (Az) of 315 degrees? _____

In "8: The Toolbar - Zoom Controls"
Q6. What is the angular diameter of the Moon? _____

In "10: Finding Objects"
Q7. What is the best time for viewing Jupiter from Toronto, Canada on the night of July 4/5, 2009?

_____

After you have finished the tutorial, proceed to the Student Exercises entitled "Unit A: Earth, Moon and Sun," which are buttons on the main sky guide pane. Answer the associated questions for these exercises on your worksheet for exercises A1 through A7.

Unit A: Earth, Moon and Sun

In "A1 part 1: Diurnal Motion"
Q8. The Sun, Moon, planets and stars rise in the _____

and set in the _____.

In "A1 part 2: Diurnal Motion Rate"
Q9. What is the rate of the Sun's diurnal motion across the sky?

_____

In "A1 part 3: The Cause of Diurnal Motion"

Q10. What do we observe diurnal motion from the surface of the Earth?

In "A1 part 4: Diurnal Motion and Location"

Q11. What appears to be the relationship between the angle that the track of the Sun makes with the horizon and the latitude of the observer?

In "A2 part 1: Night sky changes daily"

Q12. From your observations of the position of Vega, what can you conclude about the rising of stars from night to night?

In "A2 part 2: Constellations shift throughout the year"

Q13. Which of the statements given is NOT true?

In "A2 part 3: The cause of shifting constellations"

Q14. Which of the statements given in this section is correct?

Q15. What causes the slow shift of the stars and constellations from one night to the next?

In "A3 part 1: Altitude and Azimuth"

Q16. What are the approximate coordinates of Regulus as shown in the Main Window for the specific date and time in the exercise?

Altitude = _____ Azimuth = _____

Q17. After the time has been advanced by two hours, which of the statements given is correct?

_____

_____

In "A3 part 2: The meridian"

Q18. Select the statement from this section that correctly describes how Minkar's altitude changes over time.

_____

_____

Q19. At what time of day is the Sun most likely to be at its highest altitude, on the local meridian? _____

In "A3 part 3: Altitude and latitude"

Q20. What effect does changing an observer's latitude have on the altitude of Antares?

_____

_____

In "A3 part 4: Earth's circumference"

Q21. What fraction of a circle does the difference in the Sun's altitude as measured from the two cities represent?

_____

Q22. What is the circumference of the Earth using Eratosthenes' method? _____

In “A4 part 1: Angular distance”
Q23. The angular distance between Merak and Dubhe is:

_____

Q24. From this location in Toronto, Ontario, Canada, the angular distance between Polaris and the zenith is approximately:

_____ degrees

In “A4 part 2: Angular size”
Q25. The Moon’s apparent angular diameter is approximately: _____ arc minutes

In “A4 part 3: Calculating diameter”
Q26. The calculated diameter of Mars is _____ km

In “A5 part 1: The celestial equator”
Q27. Which of the given constellations does the celestial equator not pass through?

_____

Q28. Where would the celestial equator appear to be located for an observer standing directly on one of the Earth’s poles?

_____

_____

In “A5 part 3: Finding the north celestial pole”
Q29. The relatively bright star near the north celestial pole is: _____

Q30. An observer in Earth’s northern hemisphere is looking directly toward Polaris. In what direction is this observer facing?

_____

In “A5 part 4: North celestial pole and an observer’s latitude”
Q31. How does the altitude of the north celestial pole relate to the observer’s geographic latitude on the surface of Earth?

_____

_____

In "A5 part 6: The inclination of the ecliptic"
Q32. The ecliptic is inclined at 23.5 degrees to the celestial equator. This is the result of:

_____

_____

In "A5 part 7: The equinoxes"
Q33. On what date of the year does the Vernal Equinox occur, and on what date does the Autumnal Equinox occur?

_____, _____

In "A5 part 8: The solstices"
Q34. On what date does the Sun reach the most northerly point (the summer solstice) along the ecliptic? On what date does the Sun reach the most southerly point (the winter solstice) along the ecliptic?

_____, _____

Q35. An observer notices that the Sun is directly overhead at midday during the Summer Solstice. What is the observer's latitude upon the Earth?

_____

In "A6 part 2: Declination"
Q28. What is the declination of an object that lies directly on the Celestial Equator?

_____ degrees

Q36. What is the declination of an object that lies equidistant between the celestial equator and the south celestial pole?

_____ degrees

In "A6 part 3: Right Ascension"
Q37. What is the right ascension of an object exactly on the vernal equinox?

_____

In "A6 part 4: Measuring Coordinates"
Q38. Locate the star Altair in the sky. What are its approximate celestial coordinates?

RA = _____, Dec = _____

Q39. Which bright star has the following celestial coordinates? RA = 3h 59m, Dec = -13° 28′

_____

In "A6 part 5: Celestial Coordinates and an Observer's Location"
Q40. Which of the given statements in this section is correct?

_____

_____

_____

_____

In "A6 part 6: Precession"
Q41. How do the coordinates of Vega change between 3009 and 2009?

_____

In "A7 part 1: Apparent Solar Day"
Q42. What is the approximate length of an apparent solar day from June 21, 2020 to June 22, 2010?

_____

Q43. What is the approximate length of an apparent solar day from September 21, 2010 to September 22, 2010?

_____

In "A7 part 4: Sidereal Day"
Q44. What is the approximate length of a sidereal day from September 21, 2010 to September 22, 2010, when measured in the units of mean solar time?

_____

Q45. Which of the following statements comparing a mean solar day of exactly 24 hours to a sidereal day is correct?

_____

_____

Next week, we will pick back up starting with section A8. There will be no essay for your lab this week!