Assignment 3

Please type your responses into a word document, and submit that on UNM Learn. Be sure to number your responses 1, 2(a), etc. so I know which question you're answering, and **show your work** for all questions. If you get stuck, post a question on the forums. Chances are you're not the only one!

1. *(10 points) Polaris is very near the North celestial pole. How can you use this information to find your latitude at sea on a clear night if you're in the Northern hemisphere? Show your derivation, and include a picture if necessary (you can take a picture with your phone or draw something in paint—don't spend too much time on the picture).*

2. *(15 points) Where are you on Earth in each of the following?*

   (a) *The stars rise and set perpendicular to the horizon.*

   (b) *The stars circle the sky parallel to the horizon.*

   (c) *The celestial equator passes through the zenith.*

   (d) *In the course of a year, all stars are visible.*

   (e) *The Sun rises on March 21 and doesn't set until September 21 (ideally).*

3. *(9 points) What is the phase of the Moon if it*

   (a) *rises at 3:00 pm?*

   (b) *is highest in the sky at sunrise?*

   (c) *sets at 10:00 am?*

4. *(15 points) Your friend Jake explains that the seasons occur because the Earth's orbit is elliptical, and when the Earth reaches the closest point to the Sun (the perihelion), it's Summer time, and when it reaches the farthest point (the aphelion), it's Winter, with Spring and Fall in between them.*

   (a) Cite three reasons why he is incorrect. Try to use numbers (e.g., the eccentricity of Earth's orbit) in your answer.
   (b) What actually causes the seasons of the Earth?
   (c) Upon hearing your arguments, Jake insists you prove that you're correct. Elaborate on one experiment you could do together that would prove you right.