Saliba Chapter 4: Islamic Astronomy Defines Itself: Critical Innovations

1. What were the types of problems Islamic astronomers found in Greek astronomy? What was the most serious of these problems?

2. What are the examples of new astronomical problems necessitated by religious requirements of Islam that were not considered in earlier traditions?

3. Why was Ibn al-Shatir's lunar model particularly important?

4. What did Averroes (Ibn Rushd 1126-1198) mean by "The science of astronomy of our time contains nothing existent rather it conforms only to computation, and not to existence" ?

5. What are the two mathematical theorems invented by Muslim mathematicians/astronomers specifically to address problems encountered in Almagest?

6. State Urdi's Lemma and give some examples of astronomers who made use of his lemma.

7. What was Tusi's purpose in his theorem now called "Tusi couple theorem" in the literature? What did he achieve/produce through this theorem?

8. What did Ibn al-Shatir (1304-1375) achieve? What was his primary job?

9. What was Shams al-Din al-Khafri's understanding of the role of mathematics in describing natural phenomena?

10. What was the new standard Muslim astronomers demanded of the science of astronomy?

Some Definitions (repeat from Chp 3 handout)
Precession: Gradual rotation of earth's axis that traces out a cone.

Inclination of the Ecliptic: The axis of rotation of the Earth is not perpendicular to the plane of its orbit around the Sun, but is tilted by an angle of 23½ º . So, as the Earth revolves around the Sun, the north pole is tilted 23½ º toward the Sun on June 21, and 23½ º away from the Sun on December 21

Epicycle and Deferent: Epicycle is a circle in which a planet moves and which has a center that is itself carried around at the same time on the circumference of a larger circle, called deferent.

Equant: A planet or the center of an epicycle is assumed to move with a uniform speed with respect to the equant. This means, to a hypothetical observer placed at the equant point, the center of the epicycle would appear to move at a steady speed. However, the planet/center of epicycle will not move uniformly on its deferent.

Apogee: The point farthest from a planet or a satellite (as the moon) reached by an object orbiting it vs **perigee**