

Problem Set 1

1) [20 points] Two Martian astronomers, Marvin and Marla, are located due north and south of each other on the planet Mars. Marvin sees the Sun directly overhead (at the zenith) at noon. At the same time, Marla sees the Sun 5 degrees away from the zenith. Marla is 295 kilometers north of Marvin. Using this information, compute the circumference of the planet Mars.

[Hint: Look at the notes for the Friday, September 25 lecture.]

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2) [20 points] Suppose that Aristarchus had measured an angle of 45 degrees between the Sun and the Moon when the Moon was in its first quarter phase. Draw an accurate diagram of the positions of Earth, Moon, and Sun necessary for this measurement to be correct. In this case, what is the ratio of the Earth – Sun distance to the Earth – Moon distance?

[Hint: Look at the notes for the Monday, September 27 lecture.]

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3) [20 points] If the Earth – Moon distance were greater than the Earth – Sun distance, would an observer on the Earth be able to see the Moon in its first quarter phase? If your answer is “yes”, draw a diagram showing how this could be true. If your answer is “no”, explain why a first quarter Moon would be impossible.

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4) [40 points] During the lecture for Wednesday, September, I quoted two contrasting statements by Pascal (implying that the infinite universe was terrifying) and Fontenelle (implying that the infinite universe was liberating). Which of these two viewpoints, Pascal's or Fontenelle's, do you personally sympathize with? Discuss which influences and experiences in your life have driven you toward Pascal's or Fontenelle's viewpoint.