Mathematics 3010, Summer 2009: Chapter 5-6 Problems

History

1. Who was the author of the first known book on spherical geometry? The first book on spherical trigonometry?
2. What basic measures did Hipparchus use for angles?
3. How long was the Babylonian year? Leap year?
4. How did Ptolemy's *Almagest* get its name?
5. Pappus finds mathematics in the lives of which creatures?
6. What is odd about Heron's triangle formula, from a Greek perspective?
7. What value did Hipparchus use for pi? In decimal?
8. Which exponents were given names by Diophantus?

Mathematics

1. Find a formula for the area of an equilateral triangle of side s.
2. In a circle of radius R, what is crd of 60 degrees? 120 degrees?
3. Explain how to compute the angle between the ecliptic and the celestial equator. See problem 9 on p168 for help.
4. Write $4x^3-3x^2+2x-1$ in Diophantine notation.
5. A *perfect number* is a number equal to the sum of its proper factors (i.e. all its factors except itself). Find two perfect numbers.
6. What is the area of a triangle with sides 4, 7, and 10?
7. Heron gives square root of 2 over 3 as the area of an octagon with side length 1. Do you agree?
8. Divide 49 into two squares, following Diophantus.