**Mathematics 3820H – Mathematics from medieval to modern times**

Trent University, Fall 2014

**Assignment #1**

*Due on Wednesday, 17 September, 2014.*

Please look up the *Āryabhaṭīya*, by Āryabhaṭa, as translated by W.E. Clark, Univ. of Chicago Press, Chicago, 1930. It can be found online at:

`http://www.wilbourhall.org/pdfs/aryabhatiyaEnglish.pdf`

This is a brief work, written in Sanskrit verse *c.* 500 A.D., on astronomy (Book I) and mathematics (Book II). The following questions refer to the given translation of the *Āryabhaṭīya*. You may find the discussion and commentary made by the translator to be of use in answering the questions.

1. Verse 5 of Book I (p. 15) gives dimensions of the earth, moon, sun, and the then known planets. How accurate are these dimensions? *[2]*
2. Verse 10 of Book I (p. 19) describes certain values of the "half-chord" or sine function, apparently computed by a method described in Verse 12 of Book II (p. 29). Explain this method in modern terms. How accurate are the sine values given? *[4]*
3. Explain the definitions and formulas given in Verses 3 and 4 of Book II (pp. 21-22) in modern terms and comment on their correctness. *[4]*

Sing me a song of the hydrogen light
Three degrees Kelvin illumine the night
Three degrees Kelvin, the infrared sky
Colors too deep for the unaided eye

Sing me a song of the hydrogen band
Whispering low since the cosmos began
Whispering low as the white light shifts red
Wavefronts of hydrogen sweeping ahead

Sing me a song of the hydrogen wall
Vector me out to that light bounding all
Vector me out in that glory to dwell
End of the universe, cosmic eggshell.

John M. Ford, from his novel *Princes of the Air.*