

Mathematics 3820H – Mathematics from medieval to modern times

TRENT UNIVERSITY, Fall 2012

Assignment #1

Due on Tuesday, 18 September, 2012.

Consider the following translation, taken from [1], of verses 7 and 8 of the second book of the *Āryabhaṭīya*, written about 500 A.D. by the Indian mathematician Āryabhaṭa.

7. Half the circumference multiplied by half the diameter is the area of a circle.
This area multiplied by its own square root is the exact volume of a sphere.
8. The two sides (separately) multiplied by the perpendicular and divided by their sum will give the perpendicular (from the point where the two diagonals intersect) to the parallel sides. The area is to be known by multiplying half the sum of the two sides by the perpendicular.

For context, which you are likely to need to make sense of verse 8, please see [1].

1. Restate the assertions made verses 7 and 8 above in modern mathematical terms. [2]
2. Are the assertions made in verse 7 correct? Explain why or why not for each one. For any assertion that is not correct, explain how close it is to being correct. [4]
3. Are the assertions made in verse 8 correct? Explain why or why not for each one. For any assertion that is not correct, explain how close it is to being correct. [4]

REFERENCE

1. *Āryabhaṭīya*, by Āryabhaṭa, trans. by W.E. Clark, Univ. of Chicago Press, Chicago, 1930. It can be found online at:
<http://www.wilbourhall.org/pdfs/aryabhatiyaEnglish.pdf>

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*.