

1096-01-1419      **Mohammad K. Azarian\*** (azarian@evansville.edu), Department of Mathematics, University of Evansville, 1800 Lincoln Avenue, Evansville, IN 47722. *A Study of Risāla al-watar wa'l jaib ("The Treatise on the Chord and Sine")*. Preliminary report.

The Treatise on the Chord and Sine is one of the three most significant mathematical achievements of Ghiyāth al-Dīn Jamshīd Mas'ūd al-Kāshī (d. 1429) dealing with the calculation of sine and chord of one-third of an angle with known sine and chord. Kāshānī completed this treatise sometime after 1424 (827 A.H.L.) and before 1427 (830 A.H.L.). Unfortunately, the original manuscript is lost. But, since the core part of this risāla was about the calculation of sine of one degree, several of Kāshānī's colleagues and successors have written commentaries in Arabic with the title, *Risāla fī istikhrāj jaib daraja wāhida* ("Treatise on the Determination of the Sine of One Degree"). Our discussion mainly will be based on commentaries by Salāh al-Dīn Mūsā Qādī zāde al-Rūmī (1360-1437) and Nizām al-Dīn 'Abd al-'Alī al-Bīrjandī (d. 1528). There are two parts in the calculation of sine of one degree. First, Kāshānī applied Ptolemy's theorem to an inscribed quadrilateral to obtain a cubic equation, and then he used, for the first time, an ingenious iteration method to calculate sine of one degree to 17 correct decimal digits as a root of this cubic equation. (Received September 15, 2013)