

## SAW Conference

### Mathematical Practices in relation to the Astral Sciences

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#### Mathematical Reasonings 2

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*Al-Kashi's Two Methods of Determining  $\sin(1 \text{ degree})$ : Finding Roots and Changing Paths*

**Abstract** - Jamshid al-Kashi, the great 15<sup>th</sup>-century Persian astronomer and calculator, is well known for solving the problem of finding  $\sin(1 \text{ degree})$  late in his career using an ingenious iterative technique. His method inspired several alternate, but essentially similar approaches over the following decades. Less known is his first attempt to find  $\sin(1 \text{ degree})$  in the Khaqani Zij, which reflects more traditional methodological choices. We explore the mathematical and historical roots of both methods: what were the key features of his first method, where were his sources of inspiration, and how would his colleagues have reacted? Why might he have been dissatisfied with his first attempt, where might he have sought inspiration for the second method, and how might it have been received by his contemporaries and successors? The answers to these questions reflect on the changing nature of mathematics in general, and trigonometry in particular, in the early 15<sup>th</sup> century.