

Determinants



6.1 DETERMINANTS

At the beginning of this text, reference was made to the ancient Chinese counting board on which colored bamboo rods were manipulated according to prescribed “rules of thumb” in order to solve a system of linear equations. The Chinese counting board is believed to date back to at least 200 B.C., and it was used more or less in the same way for a millennium. The counting board and the “rules of thumb” eventually found their way to Japan where Seki Kowa (1642–1708), a great Japanese mathematician, synthesized the ancient Chinese ideas of array manipulation. Kowa formulated the concept of what we now call the determinant to facilitate solving linear systems—his definition is thought to have been made some time before 1683.

About the same time—somewhere between 1678 and 1693—Gottfried W. Leibniz (1646–1716), a German mathematician, was independently developing his own concept of the determinant together with applications of array manipulation to solve systems of linear equations. It appears that Leibniz’s early work dealt with only three equations in three unknowns, whereas Seki Kowa gave a general treatment for n equations in n unknowns. It seems that Kowa and Leibniz both developed what later became known as Cramer’s rule (p. 476), but not in the same form or notation. These men had something else in common—their ideas concerning the solution of linear systems were never adopted by the mathematical community of their time, and their discoveries quickly faded into oblivion.

Eventually the determinant was rediscovered, and much was written on the subject between 1750 and 1900. During this era, determinants became the major tool used to analyze and solve linear systems, while the theory of matrices remained relatively undeveloped. But mathematics, like a river, is everchanging