mathematics — the study of numbers and their arrangement—relies on deductive reasoning within a set system of rules. But over the centuries, argues Kline, professor emeritus at New York University, mathematicians too often relied on intuition and arguments that produced "correct" results but lacked logical justification. By 1800, mathematics was in trouble. The 19th-century invention of non-Euclidian geometry played havoc with traditional notions about spatial relationships (parallel lines *could* meet). In this century, Bertrand Russell, Kurt Gödel, and others demonstrated the impossibility of proving that math's methods and rules are consistently correct. Yet, Kline reminds us in this deft history, mathematics, despite its limitations, works. It has taken us into outer space *and* has brought us back.

THE AGE OF BIRDS
by Alan Feduccia
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In 1861, a zoological clue of great importance was unearthed in a Bavarian limestone quarry. The 140-million-year-old *Archaeopteryx* fossil linked birds with reptiles. It had been feathered *and* had teeth. Even ardent evolutionists were troubled by *Archaeopteryx's* teeth. For a long time many suspected that its skull had belonged to another animal. Skepticism subsided with the discovery of more *Archaeopteryx* fossils beginning in 1897. Today, arguments about the evolution of birds center on finer technical points that Feduccia, a zoologist at the University of North Carolina and a research associate at the Smithsonian, lucidly discusses. What was the original purpose of feathers—warmth or flight? Did the first birds lift themselves up from the ground or glide down from high places? Were they at home on the ground or in trees? The answers are all the more elusive, Feduccia notes, because most bird bones are hollow—to enhance flight—and do not preserve well. Moreover, beneath their feathers, birds tend to be very much the same. And, of course, the evolution of *flightlessness* among elephant birds, rheas, emus, and ostriches must still be explained.