

Biographies 6.1 and 6.2

6.1 James Bernoulli



James Bernoulli (1654–1705), also known as Jacques or Jakob, was born in Basel, Switzerland, into a family that had fled Antwerp a few decades earlier because of its Protestant faith and that was to produce nine mathematicians of first rank within three generations. James himself was made to study theology and completed these studies, but, against his father's will, he soon turned to mathematics and astronomy. In travels through Holland, France, and England, he familiarized himself with the state of these sciences, and he returned with theories of his own concerning comets and gravity. Before long, he was appointed professor of mathematics at the University of Basel. Inspired by the work of Leibniz concerning the infinitesimal calculus, he used it to tackle an abundance of mathematical problems (especially in astronomy and mechanics) and to describe the properties of many important curves. Indeed, he became so fascinated by the logarithmic spiral that he wrote:¹

Because our wonderful curve always in its changes remains constantly the same and identical in type, it can be regarded as the symbol of fortitude and constancy in adversity: or even of the resurrection of our flesh after various changes and at length after death itself. Indeed, if it were the habit to imitate Archimedes today, I would order this spiral to be inscribed on my tomb with the epitaph *Eadem mutata resurgo* (Although changed, I will resurrect).

Such was done. Yet, much more important than Bernoulli's description of the logarithmic spiral was his work on probability. Having been born in the very year in which de Fermat and Pascal (see Biographies 5.2 and 5.3) exchanged the famous letters that developed the fundamental principles of probability, James Bernoulli became the first to devote an entire book to the subject. His *Ars Conjectandi* (The Art of Conjecturing) was written in Latin and published posthumously in 1713. It contains, among other things, a systematic presentation of the theory of permutations and combinations, applications of probability theory to contemporary games (including the *jeu de paume*, a forerunner of tennis), and the development of the binomial probability distribution (discussed in this chapter). Bernoulli's great work also takes up a great many philosophical ideas concerning the very nature of probability (objective vs. subjective) and is interspersed with delightful examples of wit:²

Even as the finite encloses an infinite series
And in the unlimited limits appear,
So the soul of immensity dwells in minutia
And in narrowest limits no limits *inhere*.
What joy to discern the minute in infinity!
The vast to perceive in the small, what divinity!

¹As cited by F. N. David, *Games, Gods, and Gambling* (New York: Hafner, 1962), pp. 138–39.

²Dictionary of Scientific Biography, vol. 2 (New York: Scribner's, 1970), p. 50.
Source: International Encyclopedia of Statistics, vol. 1 (New York: The Free Press, 1978), pp. 18–19.