Benford's Law: The Facts, the Fun, and the Future

**Conference presentation**   **Lunch talk**   **After-dinner talk**

Benford's Law has been the research passion of Mark Nigrini, an associate professor on the faculty at The School of Business of The College of New Jersey where he teaches financial and managerial accounting and forensic accounting courses. His current line of research addresses advanced theoretical work on Benford's Law and the legal process surrounding fraud convictions.

Nigrini believes that discovering Benford's Law is like discovering a secret. Indeed, until about 30 years ago Benford's Law was a rather well kept secret. Since that time the secret has slowly but surely made itself known to more and more people (mainly auditors in their quest to uncover corporate malfeasance).

In the 1930s, a physicist named Frank Benford discovered that there were predictable patterns to the digits in lists of numbers. His results showed that the digits were not expected to be equally likely in tabulated data. The digit 1 is expected to occur about six times more often as a first digit than the digit 9. Benford's Law gives us the expected frequencies for the digits in the first, second, and third positions, and also for digit combinations (such as 64). Nigrini first proposed that auditors could use Benford's Law to detect anomalies in client data.
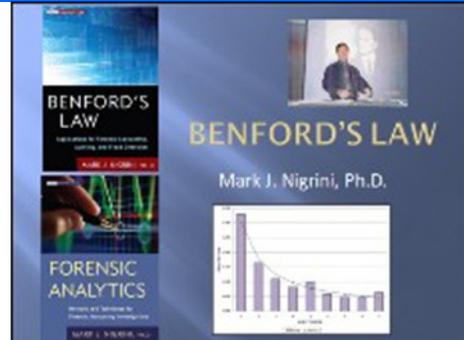
Our talk on Benford's Law will be interesting, entertaining and informative. We'll start in the past and move to the future in a logical order,

⇒ A look at a historical document from 3,000 years ago and a lively discussion of Benford's original paper and an explanation of what Benford's Law is and why we have these skewed digit patterns occurring.- Examples of some interesting authentic data sets that followed Benford's Law and some real-world fraudulent data sets that didn't follow Benford's Law.- The talk will include amusing anecdotes such as Benford's other discovery and Benford's house in Schenectady, NY.

⇒ Fun examples will be mentioned throughout including my analysis of the tax returns of former President Clinton, and my attempt to show him my work

⇒ A note on some of my remarkable applications of Benford's Law to earth science data that was published in *Mathematical Geology*.
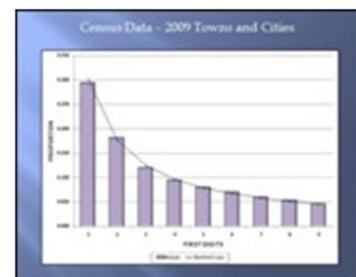
⇒ The close-to-home examples include revealing how income tax evasion may be detected using Benford's Law and the link to the lottery.

⇒ A secretive look at some suspicious activity on Bernie Madoff's American Express statement and some Madoff family expenses.

⇒ I'll share some work in progress where I've looked at data from the Madoff Ponzi scheme with some promising results suggesting that Benford's Law can be used to detect made-up Ponzi numbers.

⇒ An engaging study of the seismic data on the Magnitude 9 earthquake of the west coast of northern Sumatra on 26 December, 2004, and other earthquakes in 2010 and the link to Benford's Law.

⇒ Saving the best for last, an intriguing demonstration of the link between Benford's Law and *The Da Vinci Code by Dan Brown.*

⇒ A review of the newest Benford's Law theorem that shows that the digit patterns of the differences between the ordered elements of any data set should tend towards the frequencies of Benford's Law. The first reaction of mathematicians to my findings was some skepticism, but the theorem is true.

⇒ The exciting grand finale is an examination of the digit and number patterns in Enron's and AIG's accounting reports and the similarity between those patterns and the patterns found in Facebook's accounting reports.

Mark J. Nigrini, PhD, is a professor at The College of New Jersey where he teaches managerial accounting and forensic accounting. His current research involves advanced theoretical work on Benford's Law and the legal process surrounding fraud convictions.

Nigrini is the author of Forensic Analytics (Wiley, 2011) which describes tests to detect fraud, errors, estimates, and biases in financial data. He is also the author of Benford's Law (Wiley, 2012). His next book Losing the War against Fraud will be published in March, 2013. His work has been featured in national media including The Financial Times, New York Times, and The Wall Street Journal and he has published papers on Benford's Law in accounting academic journals, scientific journals, and pure mathematics journals, as well as professional publications such as Internal Auditor and Journal of Accountancy. His radio interviews have included the BBC in London, and NPR in the United States. His television interviews have included an appearance on NBC's Extra. He was interviewed in July for a full television program on fraud for the Investigation Discovery Channel. He regularly presents profes-

sional seminars for accountants and auditors in North America, Europe, and Asia with recent events in Singapore, Malaysia, and New Zealand.