How hard is it to compute $\int_0^1 f(x) \, dx$? This is really three questions:

- What do we mean by $f$?
- What do we mean by hard?
- What do we mean by compute?

More precisely, how hard is it to compute an estimate for the integral given only a table of values for $f$? How good are nondeterministic (random) methods? Looking at these questions in terms of information theory and computational complexity leads to surprising characterizations of the standard Newton–Cotes Rules (e.g., Simpson’s Rule) as the simplest possible. This perspective leads to new estimates for these integrals, as well as new methods for estimating integrals over higher dimensional domains.

**Time:** Thursday, 01/27/2011, 2:40-3:30pm  
**Location:** MG 124  
**Refreshments:** at 2:10pm in MG 226