In 1980, Rabin modified Miller’s primality test to obtain a polynomial-time probabilistic primality test. This was one of the first discoveries of a non-deterministic algorithm that is asymptotically faster than its best known deterministic analog. We will discuss several modern algorithms and data structures that employ nondeterminism for speed, and explore how randomness helps them run faster. Additionally, it is currently an open problem whether Turing machines with access to randomness can run strictly faster than those without; if time permits, we will go into a brief discussion of this.