"Life is like *drawing from* a box of chocolates."
Sometimes you have a pretty good idea of what you are going to get.

I. NORMAL APPROXIMATION THEOREM

[...21, 3, 2, -435, 61, 1943, $\sqrt{2}$, e , π, ...]

Draw n times with replacement.

Suppose you draw n times, with replacement from a box of numbers (not all zero). Let X denote the sum (or average) of the numbers drawn. For n large, the probability density function for $\frac{X-\mu_X}{\sigma_X}$ is approximately N(0,1) .

II. CENTRAL LIMIT THEOREM

Let X_1, X_2, X_3, ... be a sequence of independent and identically distributed random variables each having mean μ and variance σ^2. Then the distribution of

$\frac{X_1 + X_2 + ... + X_n - n\mu}{\sigma\sqrt{n}}$ tends to the standard normal as n$\rightarrow\infty$.

That is, as $n \rightarrow \infty$

$$P\left\{ \frac{X_1 + X_2 + ... + X_n - n\mu}{\sigma\sqrt{n}} \leq a \right\} \longrightarrow \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{a} e^{-x^2/2}\, dx$$