Normal and Poisson Distributions

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\[ f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \]

\[ f(z) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{z^2}{2}} \]

1. Mean, median and mode are the same and are located at center of the distribution.
2. The distribution is symmetric about the mean, median and mode.
3. The distribution extends from minus to plus infinity.
4. The normal distribution has exactly 2 parameters, a mean and a standard deviation.
The Normal Distribution A Brief History

- Abraham de Moivre - 1730 -
  First to describe the normal distribution.

- Carl Friedrich Gauss - 1795 -
  Developed formula for normal distribution.

- Adolph Quetelet - 1820 - 1840 -
  Collected data on heights and chest measurements of soldiers and found they were normally distributed.
  Concluded mean was nature's ideal.

- Charles S. Pierce - 1875 -
  Coined the term: "normal distribution"

What properties of data produce a normal distribution?

Why are many, if not most, distributions that we encounter in everyday life, not normal?
Each observation must reflect the sum of a fairly large number of independent small effects.

There must be no force operating to constrain the distributions of deviations from the mean - that is, it must be possible to have an observation that is very far (infinitely far) from the mean, even though the probability of that observation may be very small.