The Central Limit Theorem and related topics

math612.0 A1: From numbers through algebra to calculus and linear algebra

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The Central Limit Theorem

If measurements are obtained independently and come from a process with finite variance, then the distribution of their mean tends towards a Gaussian (normal) distribution as the sample size increases.

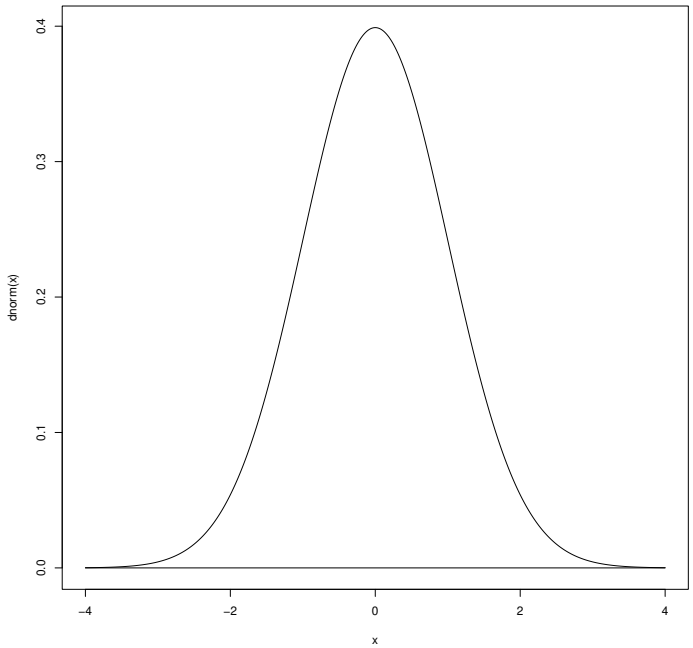

Figure: The standard normal density

Properties of the binomial and Poisson distributions

The binomial distribution is really a sum of 0 and 1 values (counts of failures = 0 and successes =1). So, a simple, single binomial outcome will correspond to coming from a normal distribution if the count is large enough.

Monte Carlo simulation

If we know an underlying process we can simulate data from the process and evaluate the distribution of any quantity based on such data.

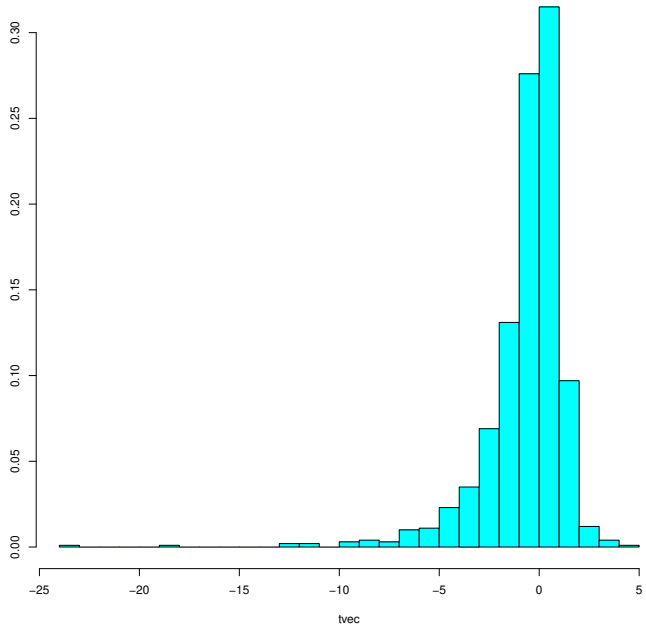

Figure: A simulated set of t-values based on data from an exponential distribution.