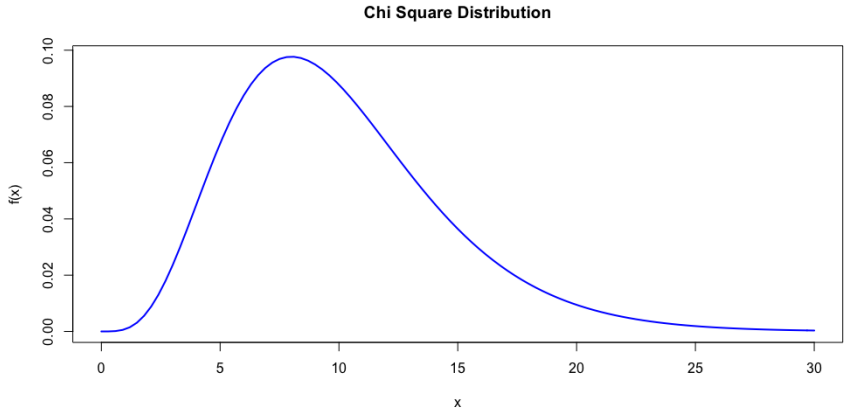
Mini Math

January 12, 2021

1. X_1, X_2, ..., X_{500} are independent random variables that form a random sample of $n = 500$ with $X_i \sim \chi^2_{10}$ for $i = 1, 2, 3, \ldots, 500$ ($E(X) = 10$, $Var(X) = 20$). $f(x)$, the probability density function for the parent distribution is shown below



Describe the probability distribution for $\overline{x}$.

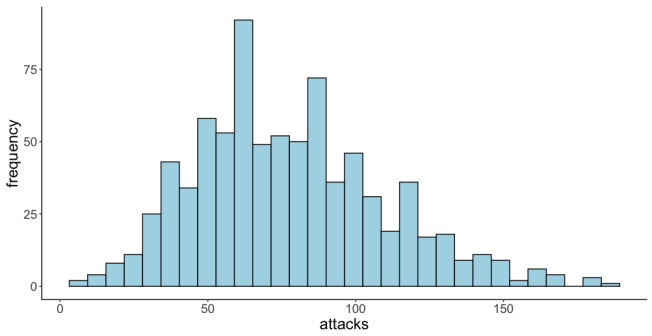
2. In each of the following cases state if assuming $\frac{\overline{x}-\mu}{\frac{s}{\sqrt{n}}} \sim t_{n-1}$ is appropriate:

   (a) X_1, X_2, ..., X_{100} are independent, identically distributed variables with $X_i \sim$ Normal(10,2).

   (b) X_1, X_2, ..., X_{10} where $X \sim$ Normal$(10, 2)$.

   (c) X_1, X_2, ..., X_{10} are identically distributed variables with $X_i \sim$ Exp(3).

3. A random sample of $n = 801$ Pokémon has an average attack score of $\overline{x} = 78$, with standard deviation $s = 32$. Suppose that the true average attack of Pokémon is know known to be $\mu = 70$. The distribution for the sample is shown below.



(a) What is the probability that you will find an average score that is less than 75 in future samples?