

EE 445

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Jan 31, 2023

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Warm up Suppose X is a random variable concentrated around 3, and $\mathbb{P}(|X - 3| > .2) < .01$. If you use 3 as an estimate of X , what is the accuracy and with what confidence?

Assessment If you can do this problem, you understand the primary thrust of the module. If you are not comfortable with probability, you may need to take my help for this.

Consider estimating the size of a finite set $S = \{1, 2, \dots, n\}$ (we do not know n in advance). We have the ability to sample from S uniformly at random (meaning the elements of S are distributed uniformly, and different draws of elements from S are independent).

Here, you can estimate the size n to within a factor of 2 with $\lceil \log n \rceil$ draws with confidence $\geq 1 - \frac{1}{n}$. The log is to base 2. Can you figure out how? Implement any algorithm you come up with to approximately estimate n (to some confidence), and simulate (the sampling and your estimate).

Show that you can estimate the size n to within a factor of 2 with $\lceil \log n \rceil$ draws with confidence $\geq 1 - \frac{1}{n}$.