Hints for exercises, Tuesday, first hour

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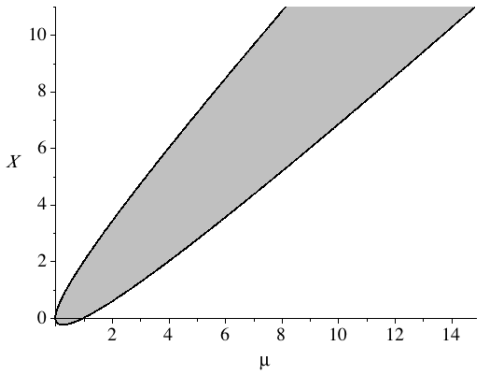
January 13, 2014

Chebyshev's ineqality Use the Markov bound on the variable $(X - \mu)^2$.

Confidence interval You can solve an equality in $\sqrt{\mu}$ by setting $y = \sqrt{\mu}$ and then solving for y.

The region between the two bounds looks like this:



Frequentist inference

1. All of the coin flips in the sum are independent.
2. Use the Markov bound with $b = 15^2$. You should get a bound of $1/9$.
3. You should end up with the answer
$$\max_p \mathsf{VAR}[S_{100}] = \frac{100}{2 \cdot 2}.$$
4. Use the Markov bound, replacing $\mathsf{VAR}[S_{100}]$ by $\max \mathsf{VAR}[S_{100}]$. You can also work with the correct value, $np(1-p)$, but this makes the algebra (much) more cumbersome.
5. Solve for p. The maximum tolerated deviation should end up being $\pm\frac{\sqrt{5}}{10}$.