Warmup

A faculty member for some strange reason sat by the Hampshire gate to campus and counted bicyclists. He noticed that in a half-hour period, 23 of 34 (68%) of the bicyclists arriving were wearing helmets. Identify clearly the PPSS in this story.

Outline

1. How close to $\mu$ is $\bar{x}$ likely to be? The probability is 95% that $\bar{x}$ will be within $1.96 \frac{\sigma}{\sqrt{n}}$ of $\mu$.

2. The idea of a confidence interval.
   (a) Suppose our variable has a normal distribution and $\sigma$ is known.
   (b) Set a confidence level $C$. Often $C = 95\%$ or $C = 99\%$. Find $z^*$ from Table C so that $P(-z^* < Z < z^*) = C$. (If $C = 95\%$ then $z^* = 1.96$. If $C = 99\%$, then $z^* = 2.576$.)
   (c) Choose a SRS of size $n$.
   (d) Then the interval
       $$\bar{x} \pm z^* \frac{\sigma}{\sqrt{n}}$$
       is a level $C$ confidence interval for $\mu$.
   (e) What this means is that our confidence interval is produced by a procedure that has a probability $C$ of capturing the mean.

3. Conditions for inference: normal distribution of population variable, SRS, known $\sigma$.
   (a) What if the population variable is not normal?
   (b) What if the sample is not an SRS?
   (c) What if $\sigma$ is not known?