Procedure for deriving C.I.'s:

1) Identify a relevant pivotal quantity and find its distribution — hard! not always possible.

(ex: $T = \frac{\bar{X} - \mu}{S/\sqrt{n}} \sim t_{n-1}$ or $T = \frac{(n-1)S^2}{\sigma^2} \sim \chi^2_{n-1}$)

2) Take quantiles of the distn of T

3) Rearrange to get

$$P(A \leq \theta \leq B) = 1 - \alpha$$

$[A, B]$ is a $(1-\alpha)*100\%$ confidence interval.

When we can't find the distribution of a relevant pivotal quantity, we approximate it using one of 2 ideas:

1) A large-sample normal approximation (Wald interval)
2) A computational sampling-based approximation (bootstrap).