8.1b

Conditions to check before constructing a Confidence Interval

1. Random – (SRS)
2. Normal – want sampling distribution to be approx. Normal
   - proportions: $np \geq 10$ and $n(1-p) \geq 10$
   - means: population must be Normal or $n \geq 30$
3. Independent – if we're sampling without replacement, 10% rule must be met.

(read p. 480)

## 8.2a Estimating Population Proportions

(use $\hat{p}$ to estimate p)

ex: What proportion of pennies in the bowl are more than 10 yrs old?

Conditions:

1. Random – we took a SRS of 68 pennies from the bowl.
2. Normal – $n\hat{p} \geq 10$ $\quad n(1-\hat{p}) \geq 10$

   $68\left(\frac{49}{68}\right) \geq 10 \quad 68\left(\frac{19}{68}\right) \geq 10$

   $49 \geq 10$ ✓ $\quad 19 \geq 10$ ✓
3. Independent – sample without replacement
   ↳ there are more than $10(68) = 680$ pennies in the bowl.

## Constructing a Confidence Interval for p

statistic $\pm$ $\underbrace{\text{critical value}}_{z^*} \cdot \underbrace{\text{St. dev. of the statistic}}$

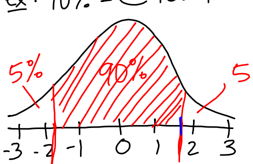
$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$

$SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

SE ↑ standard error

(when we use $\hat{p}$ instead of p).

ex: 90% = C-level



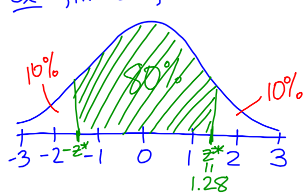

$z^* = 1.645$

on Table A: look for .95

on Calc: type in invNorm(.95)

(.95, 0, 1)

ex: find $z^*$ for 80%




look at table A for .9

or type in Calc: invNorm(.9, 0, 1)

invNorm(.9)

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ Called a 1-Sample z Interval for the population proportion

ex: Calculate 90% C.I. for proportion of pennies More than 10 yrs old

$\frac{49}{68} \pm 1.645\left(\sqrt{\frac{\frac{49}{68}(1-\frac{49}{68})}{68}}\right)$

$.72 \pm 1.645(.0544)$

$\boxed{.72 \pm .09}$

$(.63, .81)$ = 63% to 81%