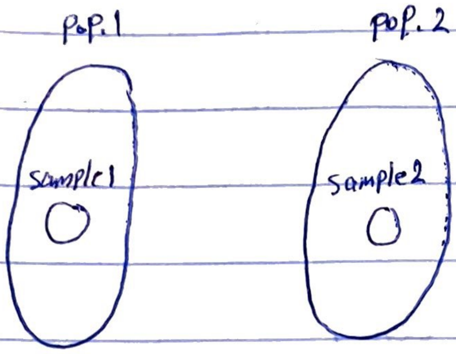
10.4 : Inferences about the difference between two pop. proportions.



π_1 : proportion in population 1

π_2 : proportion in population 2.

P_1 : proportion in sample 1

P_2 : proportion in sample 2

n_1 : sample 1 size

n_2 : sample 2 size.

★ point estimater for $\pi_1 - \pi_2 = P_1 - P_2$.

★ $(1-\alpha)$ CI for $\pi_1 - \pi_2 = (P_1 - P_2) \mp Z_{\frac{\alpha}{2}} \sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}$.

★ margen of error (E) $= Z_{\frac{\alpha}{2}} \sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}$

بدل π_1 و π_2 بـ P_1 و P_2 ★ standard error of $P_1 - P_2$: $\sigma_{P_1 - P_2} = \sqrt{\frac{\pi_1(1-\pi_1)}{n_1} + \frac{\pi_2(1-\pi_2)}{n_2}}$

★ Assumptions :

1) samples 1 and 2 Random.
2) samples 1 and 2 indep.
3) samples 1 and 2 large enough.

large enough :

pop. $n_1 \pi_1 \geq 5$, $n_1(1-\pi_1) \geq 5$.

$n_2 \pi_2 \geq 5$, $n_2(1-\pi_2) \geq 5$.

sample. $n_1 P_1 \geq 5$, $n_1(1-P_1) \geq 5$.

$n_2 P_2 \geq 5$, $n_2(1-P_2) \geq 5$.

بس الصف بدنا ندرس

★ Hypothesis Tests about $\pi_1 - \pi_2$:

$H_0 : \pi_1 - \pi_2 \geq 0$	$H_0 : \pi_1 - \pi_2 \leq 0$	$H_0 : \pi_1 - \pi_2 = 0$
$H_1 : \pi_1 - \pi_2 < 0$	$H_1 : \pi_1 - \pi_2 > 0$	$H_1 : \pi_1 - \pi_2 \neq 0$
Lower Taile test	upper taile test	two taile test

Remark: Hypothosized value for $\pi_1 - \pi_2$ is Zero.

Remark: under the H_0 when H_0 is true an equality we get $\pi_1 = \pi_2 = \pi$

↳ standared error ($\pi_1 = \pi_2 = \pi$) : $\sigma_{P_1 - P_2} = \sqrt{\frac{\pi(1-\pi)}{n_1} + \frac{\pi(1-\pi)}{n_2}}$

$$= \sqrt{\pi(1-\pi)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}.$$

★ test statistic ($\pi_1 = \pi_2 = \pi$) : $Z = \dfrac{(P_1 - P_2)}{\sqrt{P(1-P)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$.

★ Pooled estimate of π when $\pi_1 = \pi_2 = \pi$: $P = \dfrac{n_1 P_1 + n_2 P_2}{n_1 + n_2}$

★ The assumption for using this test are the same as the assumption for the CI.

★ Regect H_0 if

UTT : $Z \geq Z_\alpha$

LTT : $Z \leq -Z_\alpha$

TTT : $|Z| \geq Z_{\frac{\alpha}{2}}$.

★ Regect H_0 if P-value $\leq \alpha$.