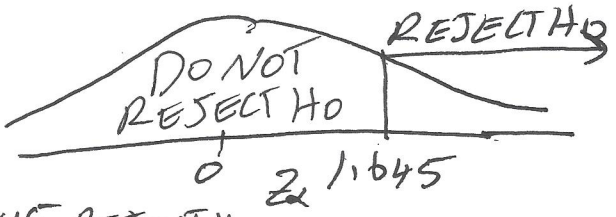
III Two Population Proportion - One Sided Test

If we are asked if P_1 is greater than P_2 - Same data example 5-12

(1) $H_0: P_1 - P_2 \leq 0$

$H_1: P_1 - P_2 > 0$ or $P_1 > P_2$



(2) If $Z_{obt} > Z_\alpha$ Reject H_0

$\alpha = .05$, $Z_\alpha = 1.645$, If $Z_{obt} > 1.645$ Reject H_0

(3) $$Z_{obt} = \frac{\hat{P}_1 - \hat{P}_2}{\sqrt{\hat{P}(1-\hat{P})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = 5.36$$

(4) As $Z_{obt} > Z_\alpha$ or $5.36 > 1.645$ Reject H_0, H_1 is true

(5) We are 95% confident that the population proportion of all lenses tumble-polished using the first polishing solution is greater than the population proportion of all lenses tumble-polished using the second polishing solution.

Confidence interval → Lower limit reject H_0

(2A) Using P1B3 concepts: If 0 ∉

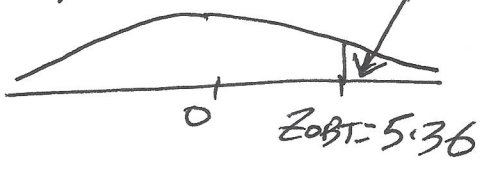
(3A) $$\text{Lower Limit} = \hat{P}_1 - \hat{P}_2 - Z_\alpha \sqrt{\frac{\hat{P}_1(1-\hat{P}_1)}{n_1} + \frac{\hat{P}_2(1-\hat{P}_2)}{n_2}}$$

Lower Limit $= 0.8433 - 0.6533 - 1.645(0.03457) = 0.13313$

(4A) As Lower Limit > 0, A $0.13313 > 0$ Reject H_0

Using P-value as a rejection rule

(2B) If P-value $< \alpha$ Reject H_0



(3B) $Z_{obt} = 5.36$, P-value $= 1 - \Phi(5.36)$

P-value $= 1 - \Phi(3.99) = 0.000033$

(4B) As P-value $< \alpha$, As $0.000033 < 0.05$ Reject H_0