II. TWO POPULATION PROPORTION - HYPOTHESIS TEST
EXAMPLE 5-12, PAGES 266-267. POPULATION PROPORTION
PARAMETERS P_1 AND P_2
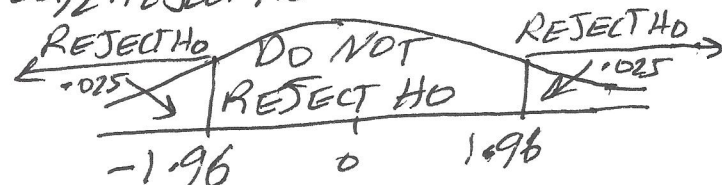
GIVEN $X_1 = 253$, $X_2 = 196$, $n_1 = n_2 = 300$, $\hat{P} = \frac{X_1 + X_2}{n_1 + n_2} = \frac{253 + 196}{600} = 0.7483$

① $\times H_0$: $P_1 - P_2 = 0$ OR $P_1 = P_2$ TWO SIDED TEST

✓ H_1: $P_1 - P_2 \neq 0$ OR $P_1 \neq P_2$ $\hat{P}_1 = \frac{X_1}{n_1}$, $\hat{P}_2 = \frac{X_2}{n_2}$

② IF $Z_{OBT} > Z_{\alpha/2}$ OR $Z_{OBT} < -Z_{\alpha/2}$ REJECT H_0

$\alpha = .05$, $\alpha/2 = .025$, $Z_{\alpha/2} = 1.96$

IF $Z_{OBT} > 1.96$ OR $Z_{OBT} < -1.96$
REJECT H_0

$\hat{P}_1 = \frac{253}{300} = 0.8433$, $\hat{P}_2 = \frac{196}{300} = 0.6533$

③ $Z_{OBT} = \dfrac{\hat{P}_1 - \hat{P}_2}{\sqrt{\hat{P}(1-\hat{P})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \dfrac{0.8433 - 0.6533}{\sqrt{0.7483(1 - 0.7483)\left(\frac{1}{300} + \frac{1}{300}\right)}} = 5.36$

④ AS $Z_{OBT} > Z_{\alpha/2}$, AS $5.36 > 1.96$ 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 1 IS DIFFERENT THAN THE POPULATION
PROPORTION OF ALL LENSES TUMBLE-POLISHED USING
THE SECOND POLISHING SOLUTION 2.

            USING THE CONFIDENCE INTERVAL

②A IF 0 IS INSIDE CI DO NOT REJECT H_0

③B USING EQUATION 5-30 ON PAGE 269 WE GET
         $0.12224 \leq P_1 - P_2 \leq 0.25776$

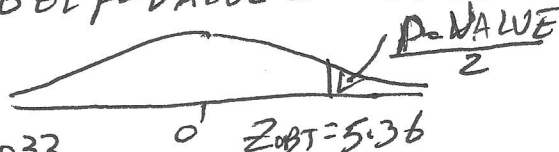④A AS 0 IS NOT INSIDE CI, REJECT H_0

            USING THE P-VALUE

②B IF P-VALUE $< \alpha$ REJECT H_0 OR P-VALUE < 0.05 REJECT H_0

③B $Z_{OBT} = 5.36$

$\dfrac{\text{P-VALUE}}{2} = 1 - \Phi(5.36)$
        $= 1 - \Phi(3.99) = 0.000033$

P-VALUE $= 2 * 0.000033 = 0.000066$

④B AS P-VALUE < 0.05, AS $0.000066 < 0.05$ REJECT H_0