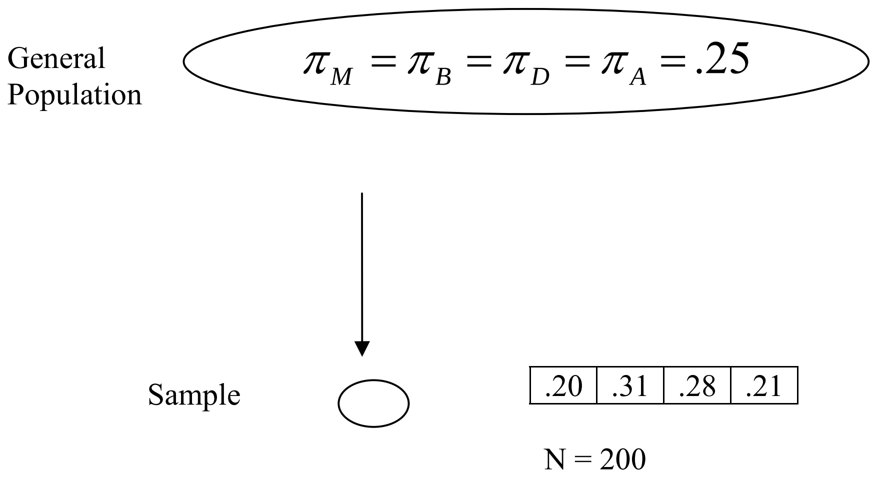
The Chi-Square Test



Step 1

$H_0 : \pi_M = \pi_B = \pi_D = \pi_A = .25$

H_1 : The proportions do differ.

$\alpha = .05$

Step 2

f_0	40	62	56	40
f_e	50	50	50	50

$$\chi^2 = \sum \left[\frac{(f_0 - f_e)^2}{f_e} \right]$$

$$= \frac{(40-50)^2}{50} + \frac{(62-50)^2}{50} + \frac{(56-50)^2}{50} + \frac{(42-50)^2}{50} = 6.88$$

Step 3

1. Critical Value (CV) Approach

$$\chi^2_{crit} = \chi^2_{\alpha,df} = \chi^2_{.05,3} = 7.81$$

$$df = C - 1$$

$$\chi^2_{calc} < \chi^2_{crit}$$

Fail to reject H_0

2. The p value Approach

$$p = .08$$

$$p > \alpha$$

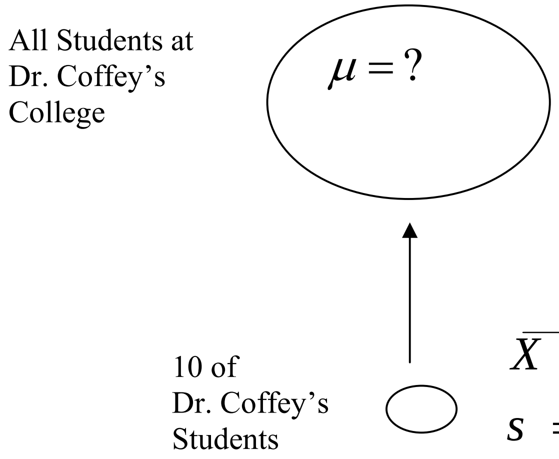
Fail to reject H_0

Step 4

Fail to reject H_0

There is insufficient evidence that, in the population, the four candidates differ in terms of the proportion of voters preferring each. ($\chi^2_3 = 6.88, p = .08$).

Interval Estimation



$\bar{X} = 9.90$

$s = 4.07$

$n = 10$

Point Estimate ± (Critical Value at α)(SE)

$$\bar{X} \pm t_{\alpha,df} \cdot s_{\bar{X}}$$

A 95% (α = .05) Confidence Interval

$$9.90 \pm (2.262) \cdot (1.29) = 9.90 \pm 2.92$$

$$6.98 < \mu < 12.82$$

A 99% (α = .01) Confidence Interval

$$9.90 \pm (3.250) \cdot (1.29) = 9.90 \pm 4.19$$

$$5.71 < \mu < 14.09$$