

CODU OF BIAS p $P_r[\text{HEAD}] = p$ $P_r[\text{TAIL}] = 1-p$ TOLD $p = \frac{1}{2}$

100 TOSSES GET 41 HEAD. IS THIS SIGNIFICANT?

AVERAGE VALUE = 50

$$\sigma^2 = npq = 100 \cdot \frac{1}{2} \cdot \frac{1}{2} = 25$$

$S_{100} = \#$ HEAD IN 100 TOSSES

S_{100} IS $N(50, 25) \equiv \frac{S_{100} - 50}{5}$ IS $N(0, 1)$

$$P_r\left[-1.96 \leq \frac{S_{100} - 50}{5} \leq 1.96\right] = .95 \Leftrightarrow P_r[40.2 \leq S_{100} \leq 59.8] = .95 \therefore \text{NOT SIGNIFICANT.}$$

CONFIDENCE INTERVALS

$P_r[a \leq x \leq b] = .95$ $[a, b]$ IS A 95% CONFIDENCE INTERVAL

% OF SMOKERS IN U.S.

EACH PERSON SMOKES W/ PROB p . SAMPLE n PEOPLE

A_x DISTRIBUTION $A_n = \frac{X_1 + \dots + X_n}{n} \rightarrow N\left(p, \frac{pq}{n}\right)$ $pq = \sigma^2$ $N\left(p, \frac{\sigma^2}{n}\right)$

$$\frac{A_n - p}{\frac{\sigma}{\sqrt{n}}} \equiv N(0, 1) \quad P_r\left[-1.96 \leq \frac{A_n - p}{\sigma/\sqrt{n}} \leq 1.96\right] = .95 \quad P_r\left[|A_n - p| \leq \frac{1.96\sigma}{\sqrt{n}}\right] = .95$$

$$\text{WANT } |A_n - p| \leq .005 \quad \frac{1.96\sigma}{\sqrt{n}} = .005 \quad \text{SAY } pq @ \text{ MAX} = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4} \quad \frac{1.96}{\sqrt{n}} = .005 \quad n =$$
$$\sigma^2 \leq \frac{1}{4}$$

$p \approx 1$ USE SMALL SAMPLE TO ROUGHLY ESTIMATE σ^2