

53 Sampling distributions for counts and proportions

(18)

Yes, No questions, e.g. toss coin 100 times, #heads? (*)

Binomial distribution $B(n, p)$

n = #observations

p = probability of success

(*) $B(100, \frac{1}{2})$

Facts for $X \sim B(n, p)$ mean $\mu_X = np$

$$\text{var } \sigma_X^2 = np(1-p)$$

$$\text{s.d. } \sigma_X = \sqrt{np(1-p)}$$

counts vs proportions

$$X \sim B(n, p) \quad \hat{p} = \frac{1}{n}X$$

$$\text{mean } \mu_{\hat{p}} = p$$

$$\text{var } \sigma_{\hat{p}}^2 = \frac{p(1-p)}{n}$$

$$\text{s.d. } \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$$

Example toss coin 100 times. Q: approx prob ≈ 60 heads?

§6.2 Significance

- Confidence interval $\leftrightarrow$ find a range of values likely to contain the true value
- significance tests $\leftrightarrow$ does the data support some claim?

Example test for a population mean difference

We have an overall population: all college students, consume ^{mean μ} 298 calories of soda each day, with s.d. $\sigma = 435$.

At CSI a sample of 100 students has sample mean 262 calories/day.

Q: is this significantly different from the overall population?

① null hypothesis $H_0 =$ no difference in mean values