Panel 1

## Proportions

An event with two outcomes, repeated repeatedly.

Prob. of success: $\pi$

Standard deviation: $s = \sqrt{\pi(1-\pi)}$ FACT

Confidence interval: std. error: $\frac{s}{\sqrt{n}} = \sqrt{\frac{\pi(1-\pi)}{n}}$

From $\bar{x} - k\sqrt{\pi(1-\pi)/n}$ to $\bar{x} + k\sqrt{\pi(1-\pi)/n}$

k depends on small or large sample as usual

df = n-1, $t_\alpha$ - value in t-table.

1

Panel 2

49 students in a class at the University of Florida made blinded evaluations of pairs of cola drinks. For the 49 comparisons of Coke and Pepsi, Coke was preferred 29 times. (a) Define a "success" as preferring Coke. Find a 95% confidence interval for the prob. of success Pi (b) In the population that this sample represents, is the above sample strong evidence that a majority prefers one of the drinks? In other words, conduct a test with null hypothesis Pi = 0.5.

$\pi = ?$ $\bar{x} = 29/49 = 0.562 \simeq \pi$

$s = \sqrt{\pi(1-\pi)} = \sqrt{0.562 \cdot (1-0.562)}$

std. error. $\sqrt{\frac{0.562 \cdot (1-0.562)}{49}} = 0.07$

$k = 1.96$

From $0.562 \pm 1.96 \cdot 0.07$ $\begin{cases} 0.423 \\ 0.7 \end{cases}$

2

Panel 3

Statistical Test about $\pi$

$H_0: \pi = \#$

$H_a: \pi \neq \#$

$t_0 = \dfrac{\bar{x} - \pi}{\sqrt{\pi(1-\pi)/n}}$ or $z_0$ (n large)

Decide: $p = 2P(z > |z_0|) < 0.05 \Rightarrow$ Reject $H_0$

look up $t_\alpha$ (n small) $\Rightarrow$ if $|t_0| > t_\alpha \Rightarrow$ Reject $H_0$

$df = n-1$, $t_{0.025}$

3

Panel 4

49 students in a class at the University of Florida made blinded evaluations of pairs of cola drinks. For the 49 comparisons of Coke and Pepsi, Coke was preferred 29 times. (a) ~~Define a "success" as preferring Coke. Find a 95% confidence interval for the prob. of success Pi.~~ (b) In the population that ~~this sample represents~~, is the above sample strong evidence that a majority prefers one of the drinks? In other words, conduct a test with null hypothesis Pi = 0.5.

$H_0: \pi = 0.5$

$H_a: \pi \neq 0.5$

$z_0 = \dfrac{29/49 - 0.5}{\sqrt{0.5(1-0.5)/49}} = \dfrac{0.092}{0.0714} = 1.288$

$p = 2P(z > 1.288) > 0.05$ inconclusive

4

Panel 5

Ex: To cover increasing cost of services in local government, you can do (a) increase taxes or (b) decrease services

Ask 1200 voters. 53% to raise taxes, 47% to decrease services. What should you vote for?

$H_0: \pi = 0.5$

$H_a: \pi \neq 0.5$

Success: Raise taxes

Vote to raise taxes

$$z_0 = \frac{\bar{x} - \pi}{\sqrt{\pi(1-\pi)/n}} = \frac{.53 - 0.5}{\sqrt{0.25/1200}} = \frac{0.03}{\#} = 2.078$$

$p = 2P(z > 2.078) < 0.05 \Rightarrow$ Reject $H_0$

5

Panel 6

One Tail vs. Two Tail Test

Ex: Weight of flour is labeled as 500g. You suspect it is less. Pick $n = 100$ samples, find $\bar{x} = 498.2$, $s = 10$.

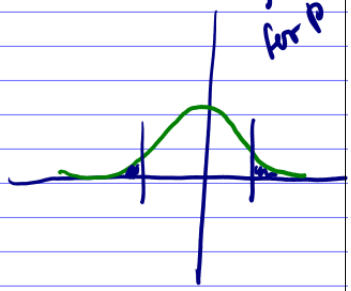
$H_0: \mu = 500$

$H_a: \mu \neq 500$ — 2-tail

$\mu > 500$ — 1-tail

$\mu < 500$ — 1-tail

For 1-tail test, use only one side for p



$z_0 = \cdots$

$p = 2P(z > |z_0|)$

6

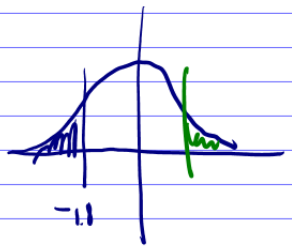
Panel 7

One Tail (2 tail)

Ex: Weight of flour is labeled as 500g. You suspect it is less. Pick $n = 100$ samples, find $\bar{x} = 498.2$, $s = 10$.

$H_0: \mu = 500$

$H_a: \mu < 500$ $\mu \neq 500$




$z_0 = \frac{498.2 - 500}{10/\sqrt{100}} = -1.8$

$p = P(z < -1.8) = 0.0359 < 0.05 \Rightarrow$ Reject $H_0$.

$0.07 > 0.05 \Rightarrow$ Inconclusive!

Panel 8

Review Wed.

Test 3 next Monday.

Final: May 11 @ 2:30pm