

This time: Significance testing
 next time: comparing 2 samples
 reading: FPP ch 27

Durhamorton

Case Study
 12
 Continued

$$\hat{SE}_{\text{IID}}(\bar{y}) = \frac{s}{\sqrt{n}} = \frac{3.0 \text{ days}}{\sqrt{100}} = 0.3 \text{ days}$$

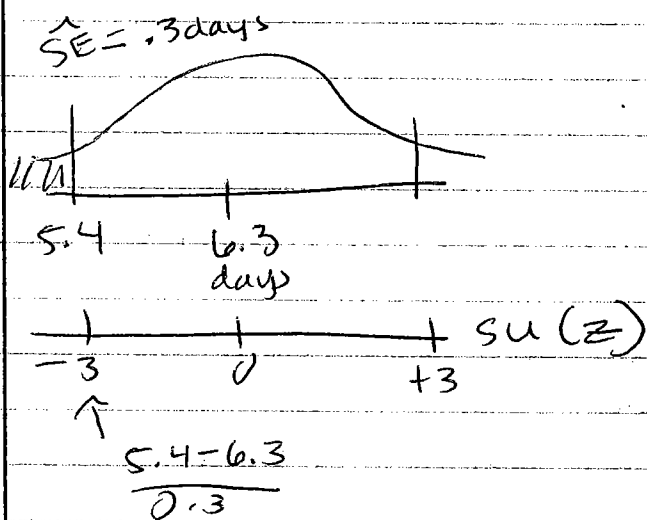
so

$$z = -3$$

• What does z mean?

- z is the distance between \bar{y} and μ under the Null in standard units.

long run
 histogram of
 \bar{y} under Null



How unusual
 is this z
 statistic?

• P value = P = chance, if null is true, of getting data extreme as, or more extreme than, what you got.

Q: where is "more extreme" than we got?

A, Look at the form of H_a : here alt. is $\mu < 6.3$,
 so we look only at $\bar{y} < 5.4$

- here we look only in one tail of the normal curve to get P : one tailed test;
 so here:

$$P = 0.15\%$$

Final
 Step

* Since P is small, we favor the Null hypothesis.

- if P is large, we favor the Null.

Q₂:

How small is small enough?

A₂:

No general answer; depends on real world consequences of making a wrong choice.

However, there are conventions

$P \leq 5\%$ = "Statistically significant" (stat. sig)
 $P \leq 1\%$ = "highly stat. sig."

• here, the result is highly stat sig; the alternative is highly favored

But...

we cannot tell if flex time caused this decline.

- could have been due to some other change over time.

- a better design: compare 2 groups at the same time; one on flex time, the other not.

Case Study 13

• Mr Frank Alpert and the Class Project

H₀ = Mr Alpert's method is like SRS (\hat{p} Expected to be 3)

H_a = Mr Alpert's method is not like SRS: \hat{p} might be $>$ or $<$ 33% (2 sided hypothesis)

Pretending H₀ is true

* I = F
O = M

POP
all students @ Berkeley in '77

Sample
100 observed Students.

I. D. S
possible \hat{p} 's

gender*

gender*

$\left[\right] N = \text{big}$

$\left[\right] n = 100$

$\left[\right] \uparrow \downarrow$
EV_{IID}(\hat{p}) = $p = 33\%$

$p = 33\%$ female

$\hat{p} = 46\%$ female

SE_{IID}(\hat{p}) = 4.7%

$\sigma = \sqrt{p(1-p)}$

$s = \sqrt{\hat{p}(1-\hat{p})}$

=

