

§ 9.1-9.3 HYPOTHESIS TESTS ABOUT POPULATION MEANS

SUPPOSE A COMPANY MAKES 10 LB. WEIGHTS.

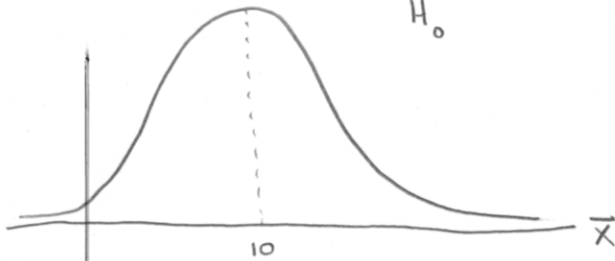
COMPANY CLAIMS  $\mu = 10$ . BUT YOU ARE SKEPTICAL.

HOW COULD YOU "PROVE" THEM WRONG?

GATHER  $n = 50$  WEIGHTS AND FIND AVE. WEIGHT  $\bar{x}$  AND STAN. DEV.  $s$ .

ASSUME  $\mu = 10$  (NULL HYPOTHESIS)  
 $H_0$

ALT. HYPOTHESIS:  $\mu \neq 10$   
 $H_a$



ASSUMING  $\mu = 10$ , IT IS UNLIKELY FOR  $\bar{x}$  TO BE FAR FROM 10.

SO IF  $\bar{x}$  IS FAR FROM 10, THIS WOULD SUGGEST OUR ASSUMPTION IS WRONG

REJECT NULL HYPOTHESIS  $\rightarrow$  ACCEPT ALT. HYPOTHESIS.

MAKE PRECISE:

$\alpha$  DENOTES PROBABILITY THRESHOLD

FOR "UNLIKELY". COMMON VALUES:

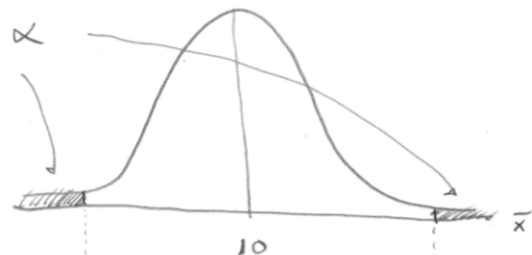
.05, .01.

(IS IS  $P(\text{TYPE I ERROR})$ )

"two-tailed"

REJECT  $H_0$  WHEN  $H_0$  IS TRUE.

MAKE PRECISE:

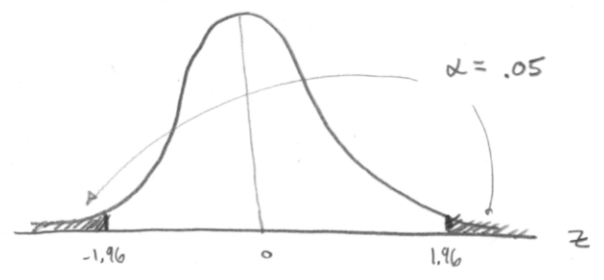


REJECTION REGION

ACCEPTANCE REGION

REJECTION REGION

TEST STATISTIC  $z = \frac{\bar{x} - \mu}{s/\sqrt{n}}$

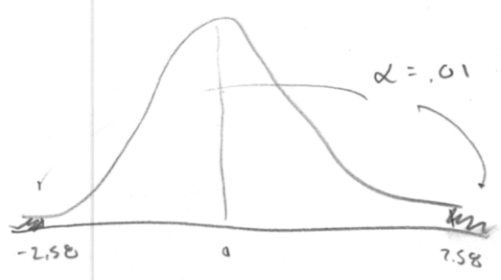


WE CAN REJECT  $H_0$  AT THE .05 SIGNIFICANCE LEVEL IF THE TEST STATISTIC IS  $z \leq -1.96$  OR  $z \geq 1.96$ .

SAM  $\bar{x} = 10.06$   $S = .2$   $n = 50$

THEN  $z = \frac{10.06 - 10}{.2/\sqrt{50}} \approx 2.12$

REJECT AT  $\alpha = .05$  SIG. LEVEL



BUT NOT AT  $\alpha = .01$  SIG. LEVEL.

P-VALUE IS SMALLEST VALUE OF  $\alpha$  FOR WHICH YOU WOULD REJECT  $H_0$ .

ex. 9.13      9.9

ONE-TAILED TEST:    9.6    9.14    9.15

9.10