

HYPOTHESIS TESTING

Null Hypothesis: H_0 — Trying to disprove

Alternative Hypothesis: H_a — What you think is happening

Testing airbags. Researchers believe they do not open properly.

H_0 : Airbags open properly.

H_a : Airbags do not open properly

Developers believe new paint dries more quickly.

H_0 : Paint dries at the same rate or slower

H_a : Paint dries faster.

Hypothesis Test

- 1) Define parameters. (What numerical info is needed.)
- 2) Set up H_0 + H_a . (in terms of #'s using $<, >, =$)
- 3) Set the criteria for the test.
 - a) What kind of distribution (normal)
 - b) Set level of confidence. (for H_0)

$p < 0.05$	$p \leq .01$
(95%)	(99%)
- 4) List sample evidence.
 n, \bar{x}, σ or $s, \sigma_{\bar{x}}, Z^*$ (called the test statistic)
- 5) Find probability. ($p =$)

$$Z^* = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$$
- 6) If $p < \#$, then Reject the H_0 .
 If $p > \#$, then Fail to Reject the H_0 .

Millvale H.S. - National Test

95% confidence

National Test $\mu = 50$ $\sigma = 10$

900 students $\bar{x} = 51.1$ $s = 10$

Did Millvale students really do better?

1) Parameter: student test scores


2) $H_0: \mu = 50$ (\leq)

$H_a: \mu > 50$

3) Criteria: Normal; $p < 0.05$

4) $n = 900$, $\sigma = s = 10$, $\bar{x} = 51.1$ $\mu = 50$

$$\sigma_{\bar{x}} = \frac{10}{\sqrt{900}} = 0.333 \quad Z^* = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{51.1 - 50}{0.333} = 3.3$$

5)  $p = 0.0005$

6) Reject the H_0 ; MHS students did perform better.

Kelley Employment Agency $\mu = 82$ $\sigma = 8$
 Brown Agency $n = 36$ $\bar{x} = 79$ $s = 8$

1) Param: test scores

2) $H_0: \mu \neq 82$

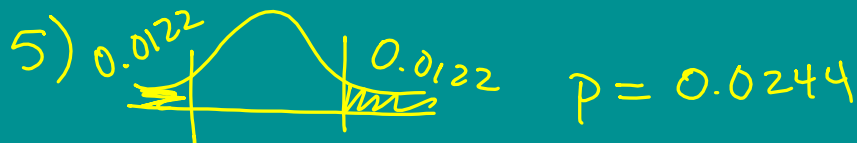
$H_a: \mu = 82$

3) Criteria; Normal, $p < 0.05$

4) $n = 36$ $\bar{x} = 79$ $s = 8$

$$\sigma_{\bar{x}} = \frac{8}{\sqrt{36}} = 1.333$$

$$Z^* = \frac{79 - 82}{1.333} = -2.25$$



6) Reject the H_0 ; Test means are the Same.