Hypothesis Testing about Two Independent Means μ_1 versus μ_2 Solutions

Language

The means are the same.
The means are not different.
$\boldsymbol{\mu_1 = \mu_2}$

The means are not the same.
The means are different.
$\boldsymbol{\mu_1 \neq \mu_2}$

μ_1 is more than μ_2
$\boldsymbol{\mu_1 > \mu_2}$

μ_1 is less than μ_2
$\boldsymbol{\mu_1 < \mu_2}$

μ_1 is no more than μ_2
$\boldsymbol{\mu_1 \leq \mu_2}$

μ_1 is at least μ_2
$\boldsymbol{\mu_1 \leq \mu_2}$

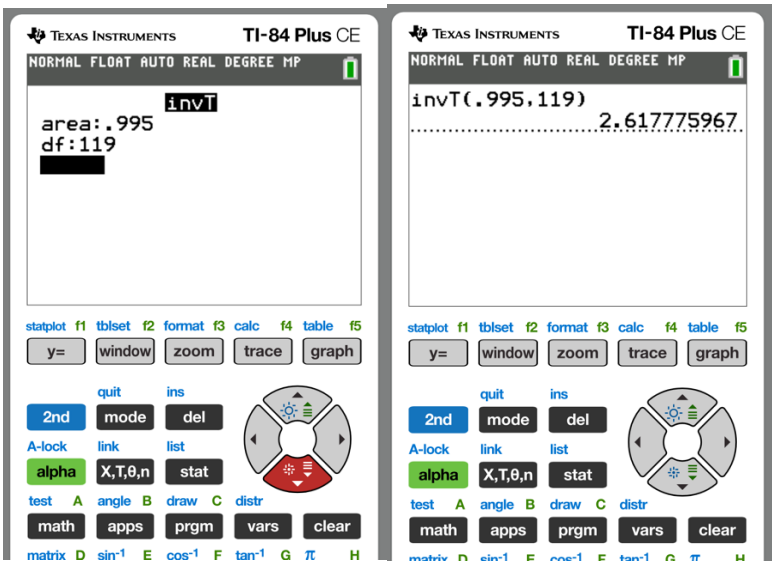
Age of College Students

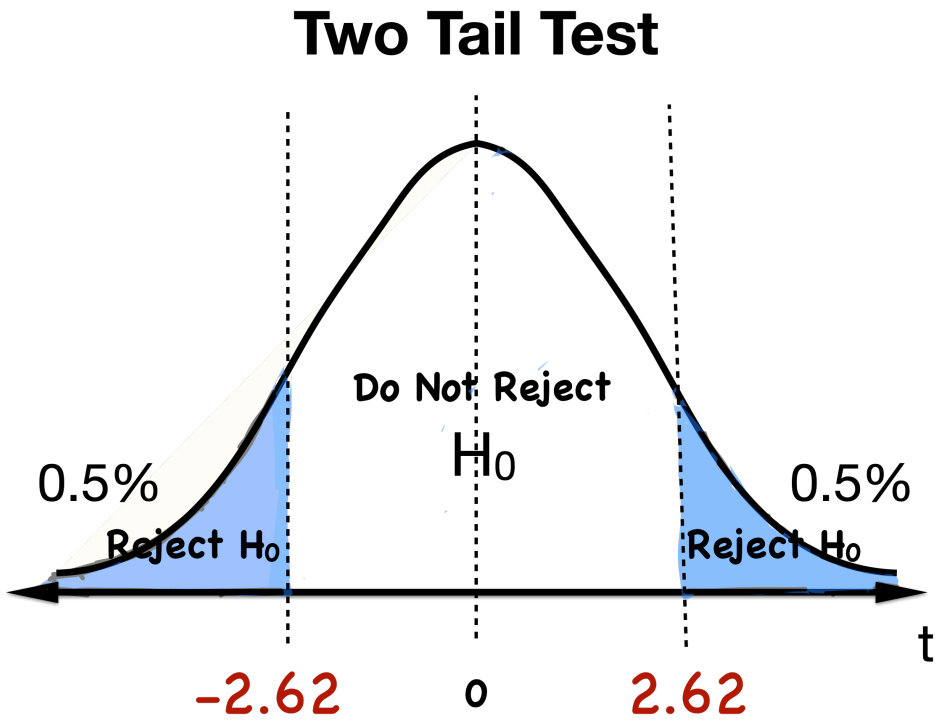
The mean age of female college students is not the same as the mean age of male college students as claimed by Professor Snodgrass. A sample of 120 female college students reveal a mean age of 23.2 with a standard deviation of 2.8 years while a sample of 185 male college students reveal a mean age of 24.6 with a standard deviation of 3.2. Use the 1% level of significance to test this claim by the **Traditional Method** and answering the following questions.

1. What is the claim? $\boldsymbol{\mu_1 \neq \mu_2}$ Claim
2. What kind of test is this? **Two Tail Test**
   Two Tail Test, Left Tail Test, or Right Tail Test
3. What is the critical value(s)? **Approximate Hundredths 2.62**
4. What is the test statistic? **Approximate Hundredths -4.03**
5. What is your conclusion? **The Sample Supports the Claim**

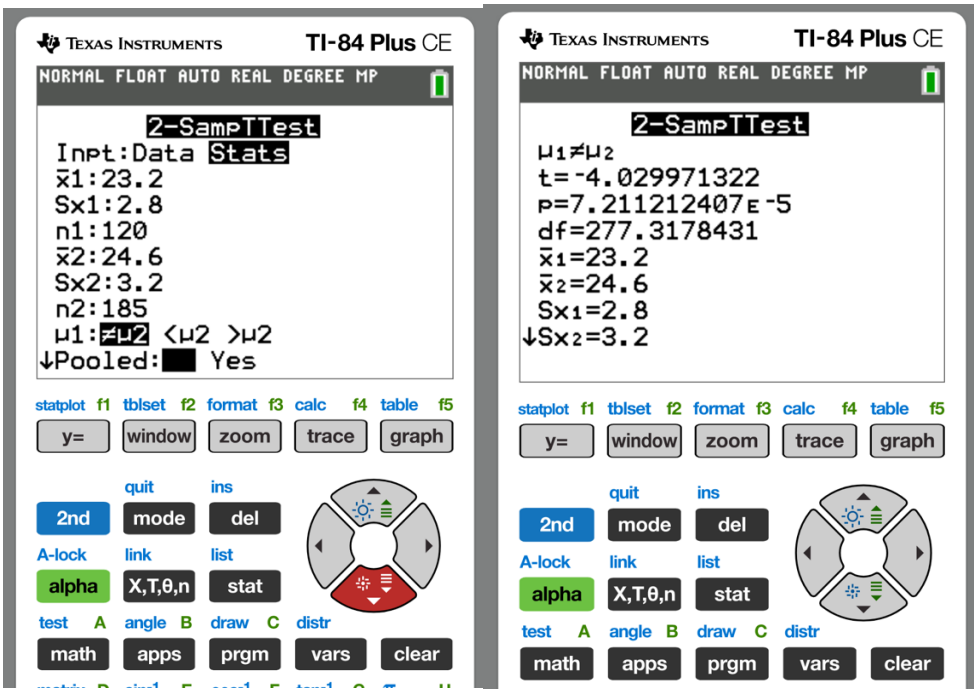
$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$ Claim





2-SampleTTest



$t \approx -4.03$

Reject H_0

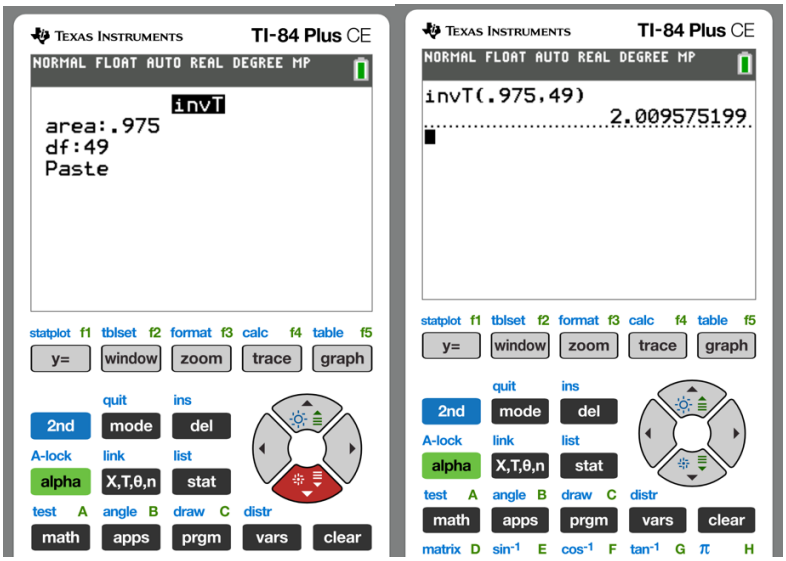
The Sample Supports the Claim

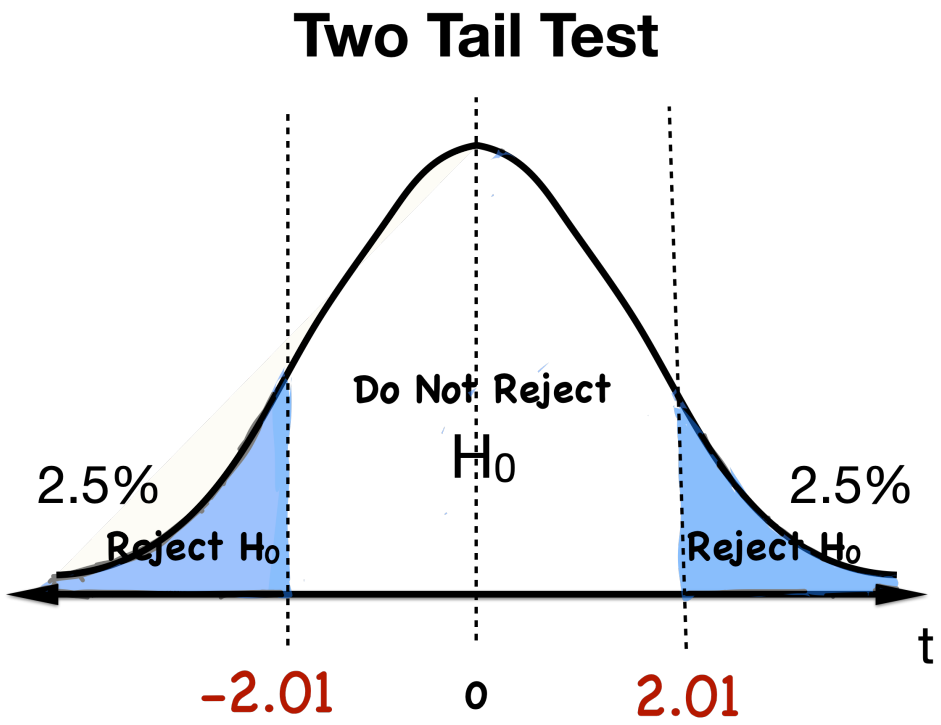
Income Disparity Amongst Executives

Male executives have the same salaries as female executives as claimed by the CEO league of America. That is, the mean salary of male executives is the same as the mean salary of female executives. A sample of 50 male executive salaries reveal a mean of $ 253,650 per year with a standard deviation of $ 12,680, while a sample of 65 female salaries reveal a mean of $ 236,475 with a standard of deviation of $ 22,560. Use the 5% level of significance to test this claim by the **Traditional Method** and answering the following questions.

6. What is the claim? $\mu_1 = \mu_2$ Claim
7. What kind of test is this? **Two Tail Test**
   Two Tail Test, Left Tail Test, or Right Tail Test
8. What is the critical value(s)? **Approximate Hundredths 2.01**
9. What is the test statistic? **Approximate Hundredths t=5.17**
10. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: \mu_1 = \mu_2$ Claim
$H_1: \mu_1 \neq \mu_2$





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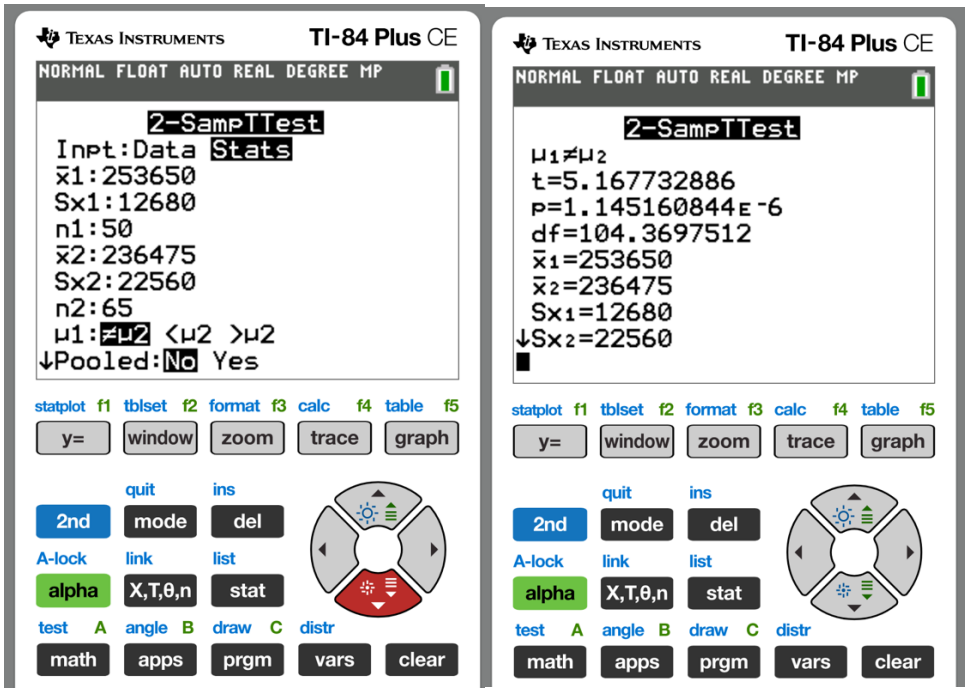


$t \approx 5.17$

Reject H_0

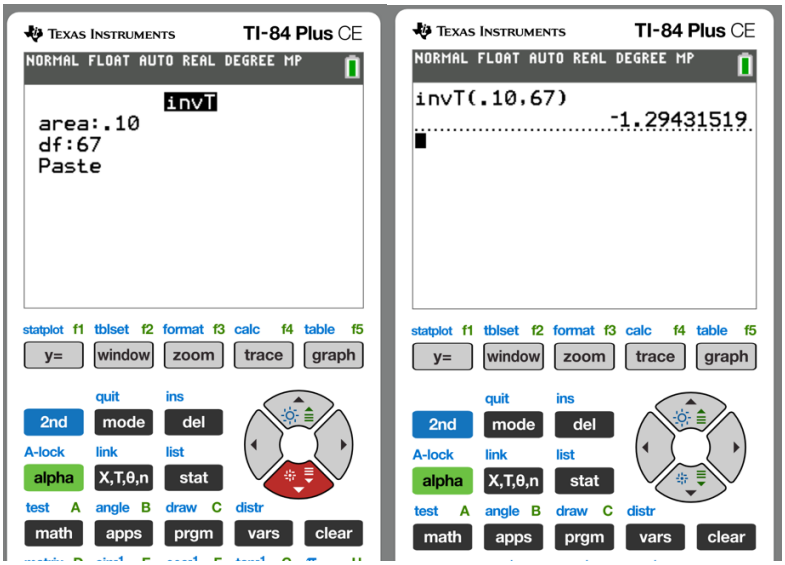
The Sample Does Not Support the Claim

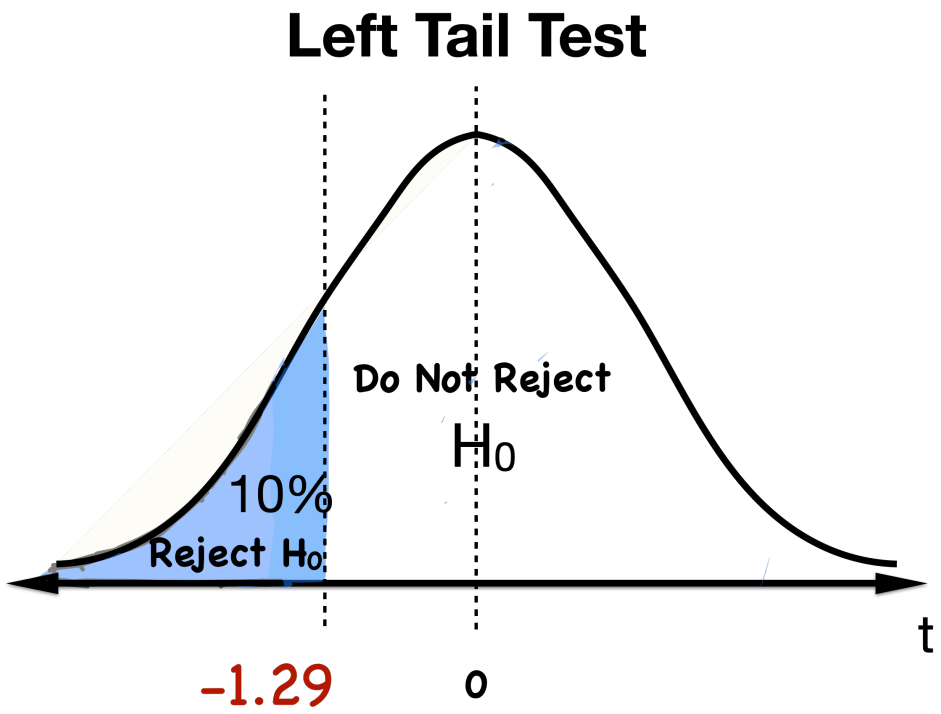
Cheeto Diet for Diabetics

Diabetics who consume Cheetos on a regular basis can lower their A1C versus diabetics who do not consume Cheetos on a regular basis, as claimed by the Potato Chip Industry of America. That is, the mean A1C of diabetics who consume Cheetos on a regular basis is less than the A1C of diabetics who do not consume Cheetos on a regular basis. A sample of 68 diabetics who consume Cheetos on a regular basis reveal a mean A1C of 7.8 with a standard deviation of 2.6, while a sample of 75 diabetics who do not consume Cheetos reveal a mean A1C of 6.9 with a standard deviation of 1.9. Use the 10% level of significance to test this claim by the **Traditional Method** and answering the following questions.

11. What is the claim? $\mu_1 < \mu_2$ Claim
12. What kind of test is this? **Left Tail Test**
    Two Tail Test, Left Tail Test, or Right Tail Test
13. What is the critical value(s)? **Approximate Hundredths -1.29**
14. What is the test statistic? **Approximate Hundredths t=2.34**
15. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: \mu_1 \geq \mu_2$
$H_1: \mu_1 < \mu_2$ Claim





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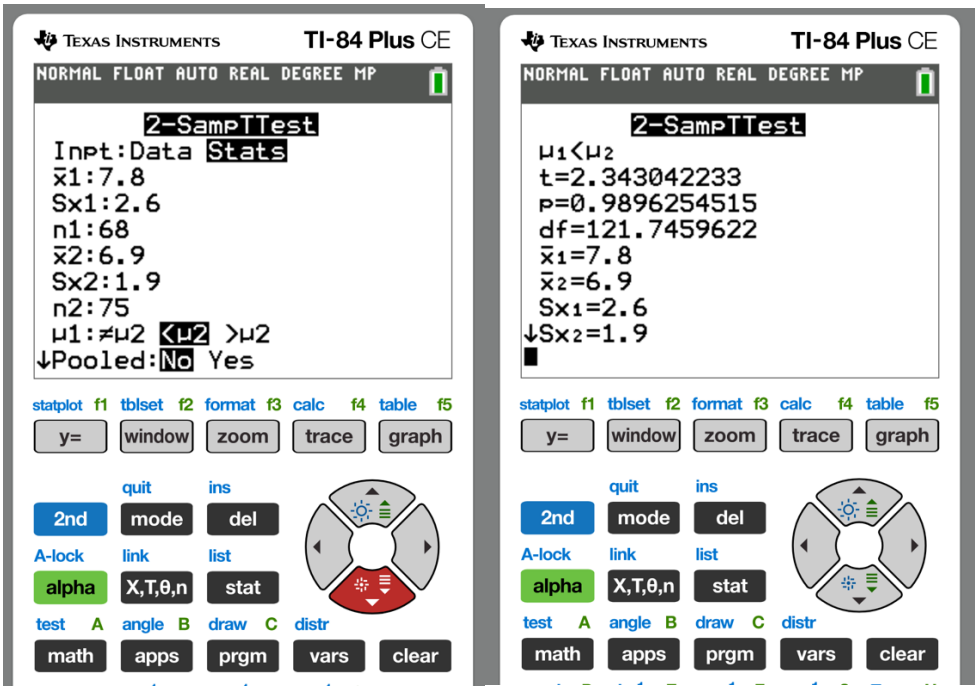


$t \approx 2.34$

Do Not Reject H_0

The Sample Does Not Support the Claim

Years in College: White Students versus Asian Students

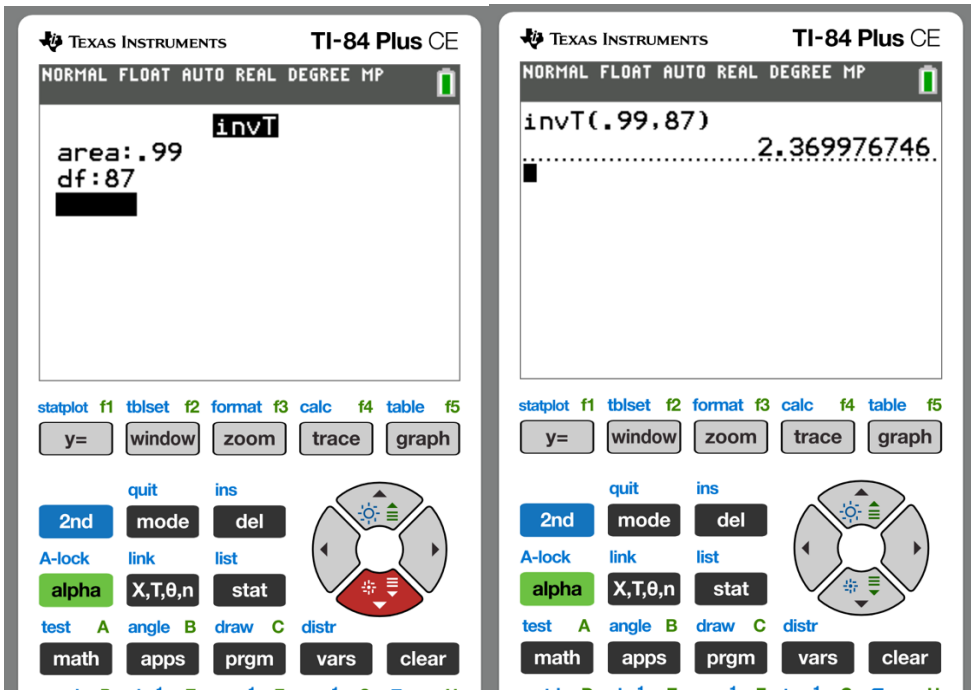
White students take longer to complete a 4-year degree than Asian students, as claimed by campus researchers. That is, the mean length of time it takes white students to complete a 4-year degree is greater than the mean length of time it takes Asian students to complete a 4-year degree. A sample of 88 white college students report a mean of 4.8 years with a standard deviation of 0.8 years, while a sample of 96 Asian college students report a mean of 4.6 years with a standard deviation of 1.2 years. Use the 1% level of significance to test this claim by the **P-Value Method** and answering the following questions.

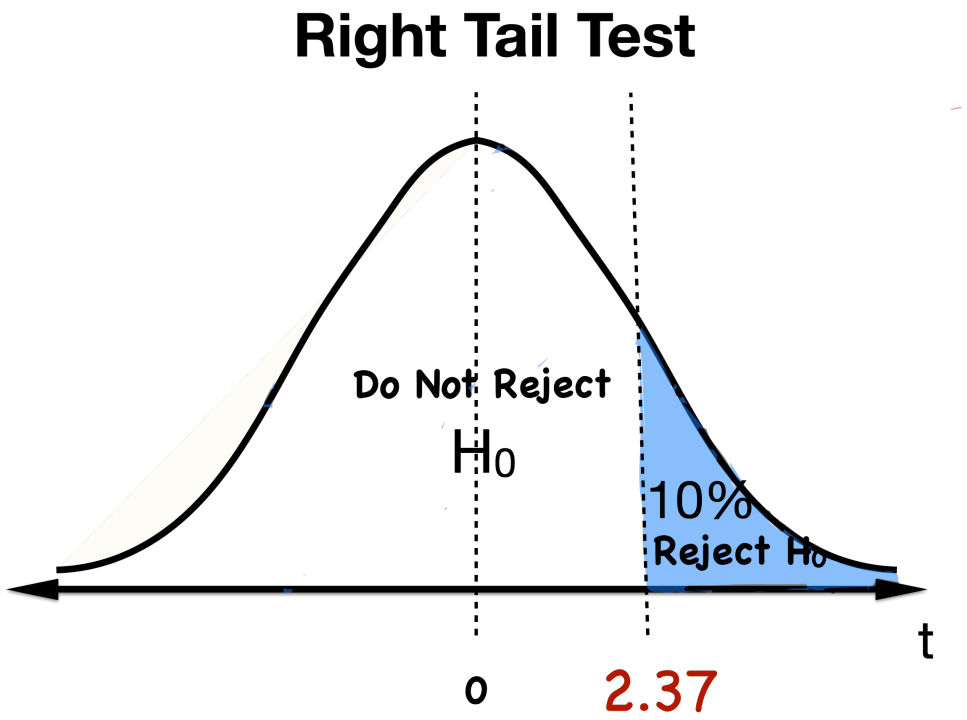
16. What is the claim? $\mu_1 > \mu_2$ Claim
17. What kind of test is this? **Right Tail Test**

    Two Tail Test, Left Tail Test, or Right Tail Test
18. What is the p-value? **Approximate Hundredths** **p=0.09**
19. What is the relationship between the p-value and the level of significance? $p < \alpha$

    $p < \alpha$ **or** $p \not< \alpha$
20. What is your conclusion? **The Sample Supports the Claim**

$H_0: \mu_1 \leq \mu_2$
$H_1: \mu_1 > \mu_2$ Claim





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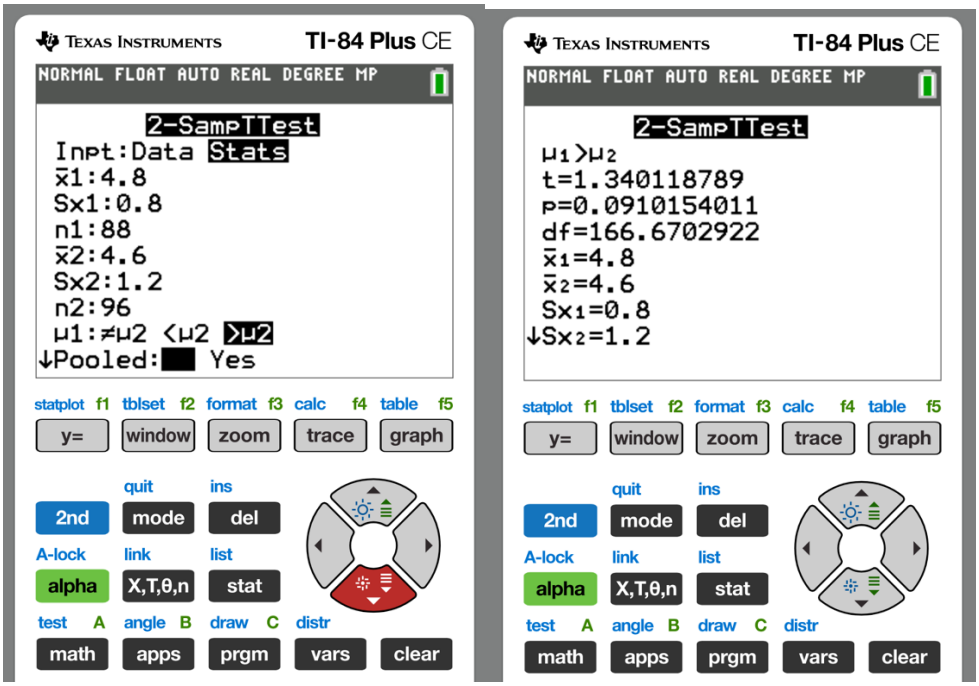


$$p \approx 0.09$$

$$0.09 < 0.10$$

Accept H_1

The Sample Supports the Claim

California Lifespan: Men versus Women

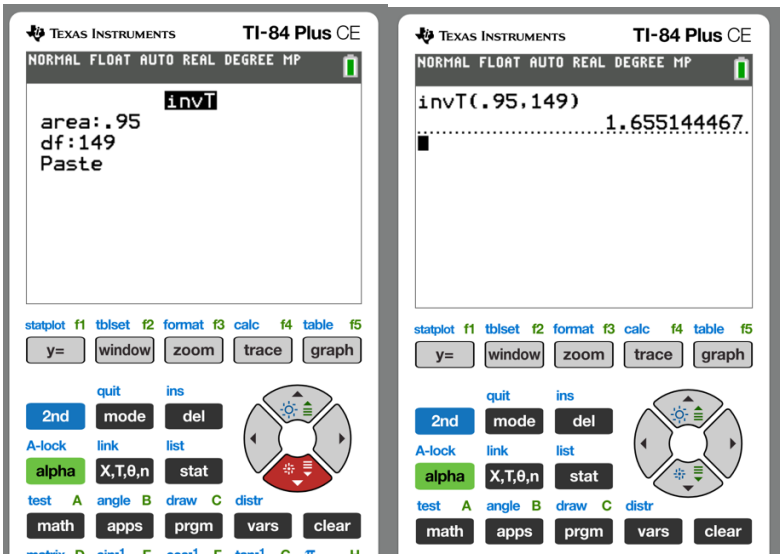
Men live longer in California than women as claimed by the State of California. That is, the mean lifespan of men is greater than the mean lifespan of women as claimed by the State of California. A sample of 150 lifespans for men reveal a mean of 74.8 with a standard deviation of 6.7 years, while a sample of 200 lifespans for women reveal a mean of 78.2 with a standard deviation of 5.6 years. Use the 5% level of significance to test this claim by the **P-Value Method** and answering the following questions.

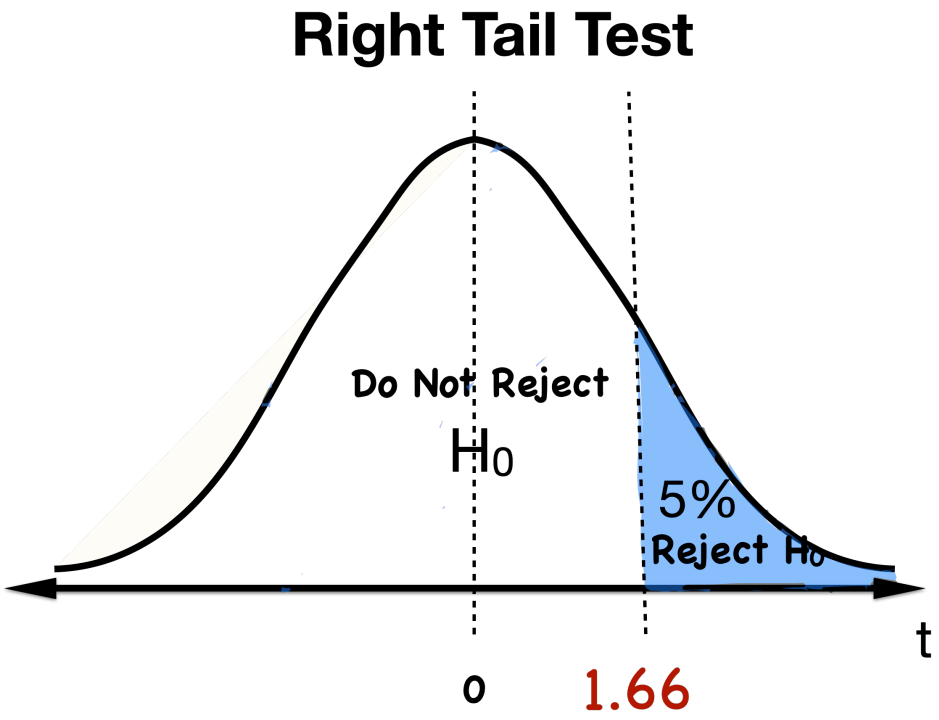
21. What is the claim? $\mu_1 > \mu_2$ Claim
22. What kind of test is this? **Right Tail Test**

    Two Tail Test, Left Tail Test, or Right Tail Test
23. What is the p-value? **Approximate Hundredths p=1.00**
24. What is the relationship between the p-value and the level of significance? $p \lessdot \alpha$

    $p < \alpha$ **or** $p \lessdot \alpha$
25. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: \mu_1 \leq \mu_2$
$H_1: \mu_1 > \mu_2$ Claim





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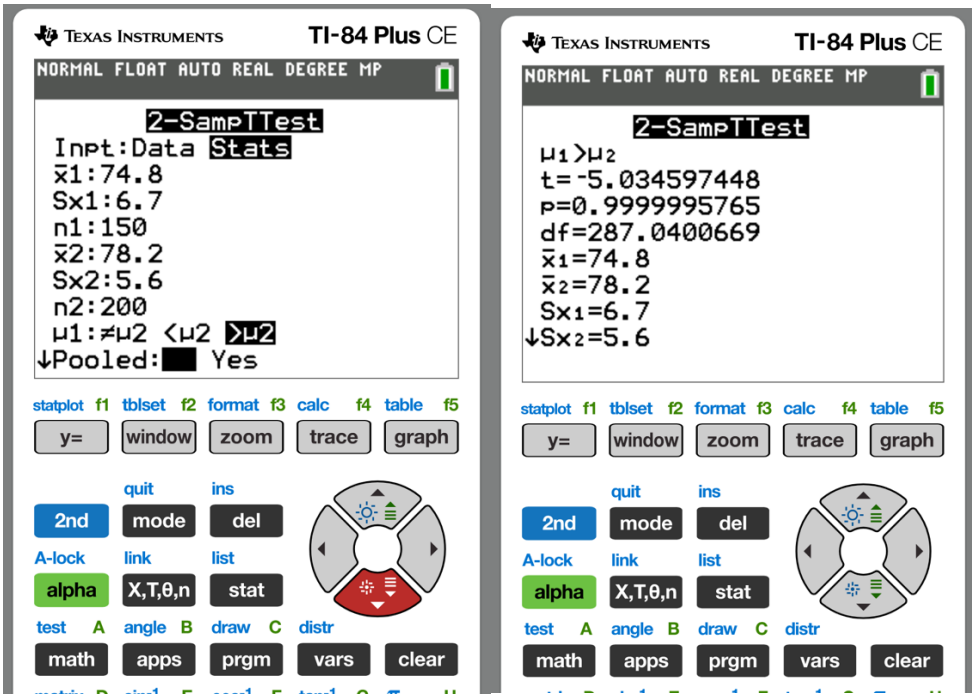


$$p \approx 1.00$$

$$1.00 \not< 0.05$$

Accept H_0

The Sample Does Not Support the Claim

US Lifespan: Southern Region versus Non-Southern Region

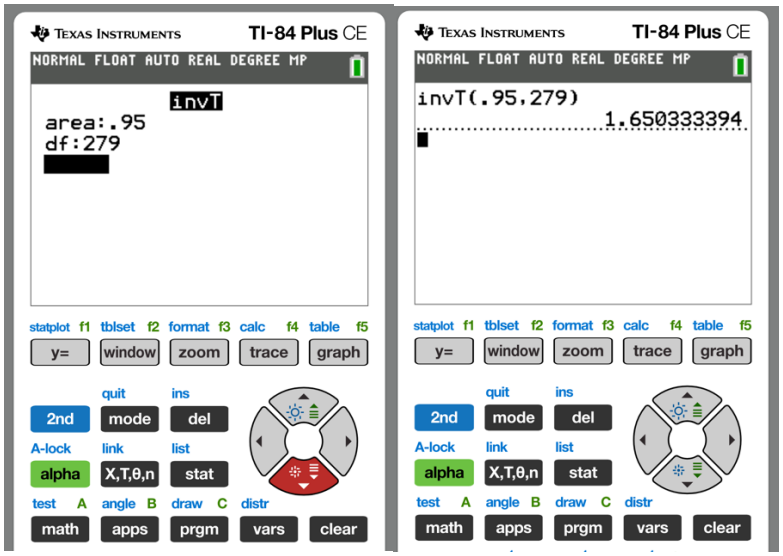
The lifespan for people living in the South is the same as the lifespan for people living outside the South as claimed by the Fast-Food Industry. That is, the mean lifespan for Southerners is the same as the mean lifespan for non-Southerners in the United States. A sample of 350 lifespans for Southerners reveal a mean of 69.2 years with a standard deviation of 8.5 years, while a sample of 280 lifespans for non-Southerners reveal a mean of 72.4 years with a standard deviation of 6.6 years. Use the 10% level of significance to test this claim by the **P-Value Method** and answering the following questions.

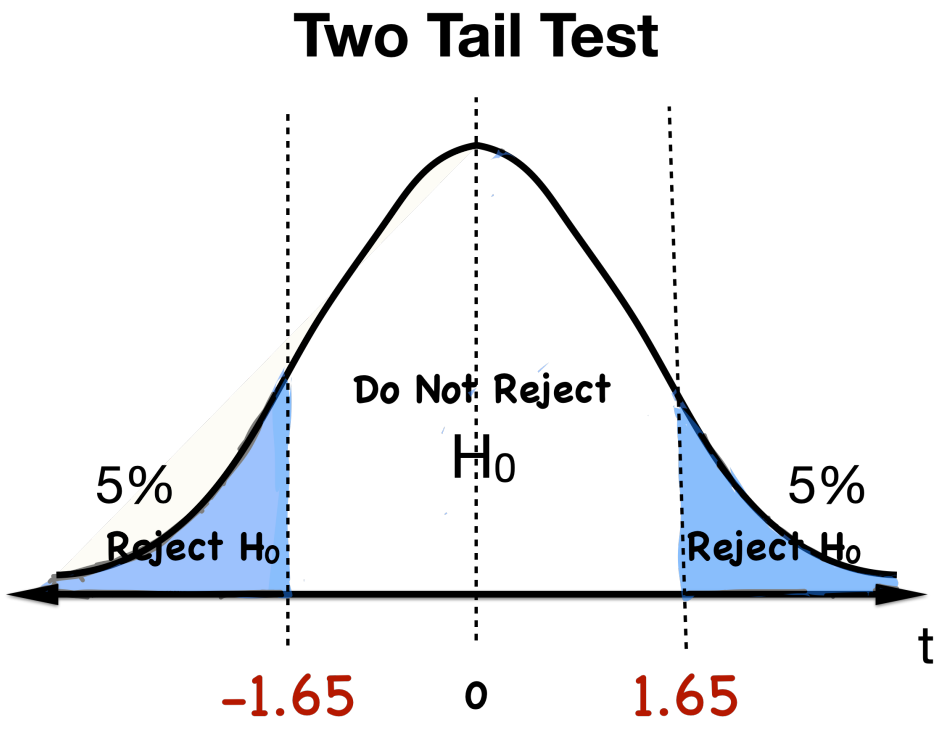
26. What is the claim? $\mu_1 = \mu_2$ Claim
27. What kind of test is this? **Two Tail Test**

    Two Tail Test, Left Tail Test, or Right Tail Test
28. What is the p-value? **Approximate Hundredths p=0.00**
29. What is the relationship between the p-value and the level of significance? $p < \alpha$

    $p < \alpha$ **or** $p \not< \alpha$
30. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: \mu_1 = \mu_2$ Claim
$H_1: \mu_1 \neq \mu_2$





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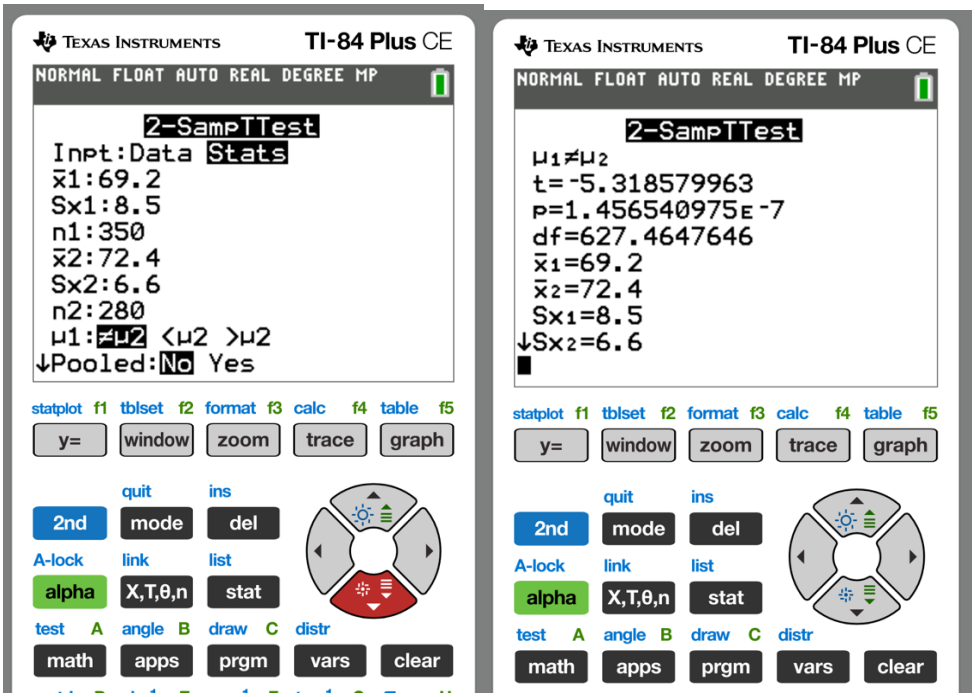

$$p \approx 0.00$$

$$0.00 < 0.05$$

Accept H_1

The Sample Does Not Support the Claim