Hypothesis Testing Comparing Two Proportions P_1 and P_2 Solutions

Language

The proportions are the same.
The proportions are not different.
$$\boldsymbol{P_1 = P_2}$$

The proportions are not the same.
The proportions are different.
$$\boldsymbol{P_1 \neq P_2}$$

P_1 is more likely than P_2
$$\boldsymbol{P_1 > P_2}$$

P_1 is less likely than P_2
$$\boldsymbol{P_1 < P_2}$$

P_1 is no more than P_2
$$\boldsymbol{P_1 \leq P_2}$$

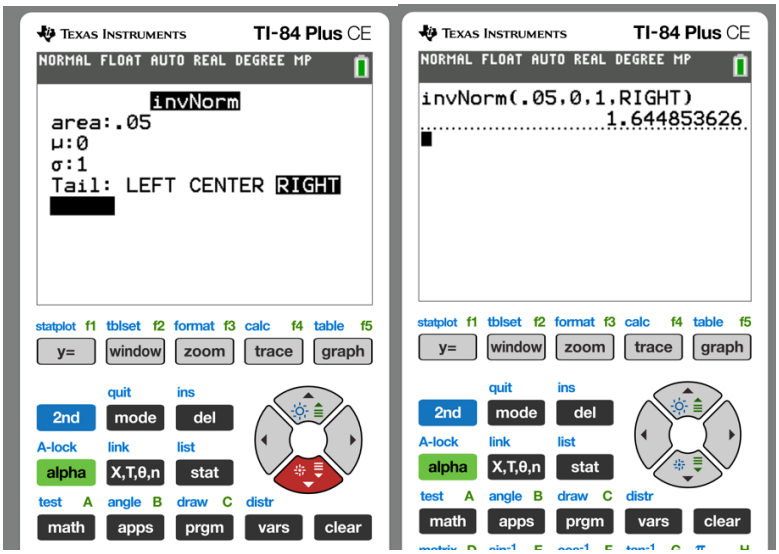
P_1 is at least P_2
$$\boldsymbol{P_1 \leq P_2}$$

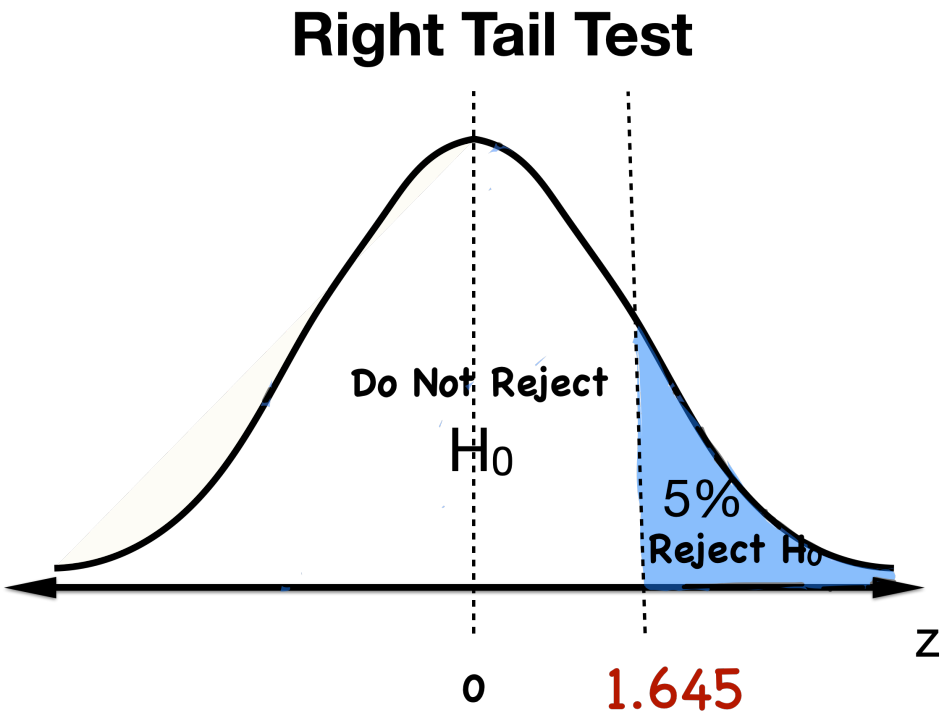
Income Disparity White versus Non-White People

White people are more likely to make more than $ 100,000 per year than non-white people as claimed by Professor Snodgrass. A sample of 500 salaries of white people reveals that 132 make more than $ 100,000 per year and a sample of 385 salaries of non-white people reveal that 108 make more than $ 100,000 per year. Use the 5% level of significance to test this claim by the **Traditional Method** and answering the following questions.

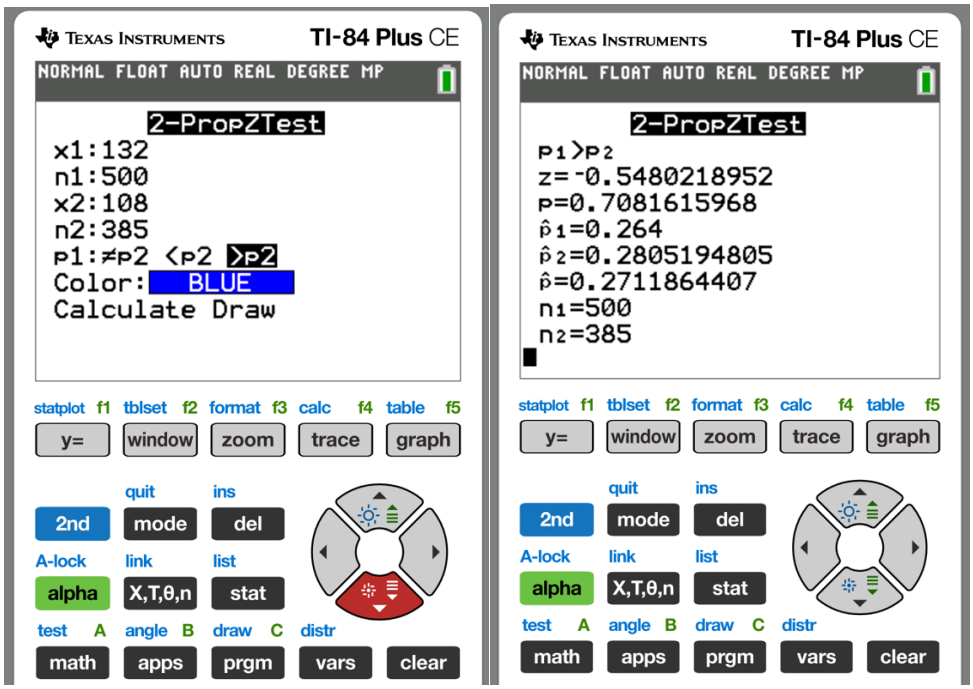
1. What is the claim? $\boldsymbol{P_1 > P_2}$ Claim
2. What kind of test is this? **Right Tail Test**
   Two Tail Test, Left Tail Test, or Right Tail Test
3. What is the critical value(s)? **Approximate Hundredths 1.65**
4. What is the test statistic? **Approximate Hundredths -0.55**
5. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: P_1 \leq P_2$
$H_1: P_1 > P_2$ Claim





Use 2-PropZTest



$z \approx -0.55$

Do Not Reject H_0

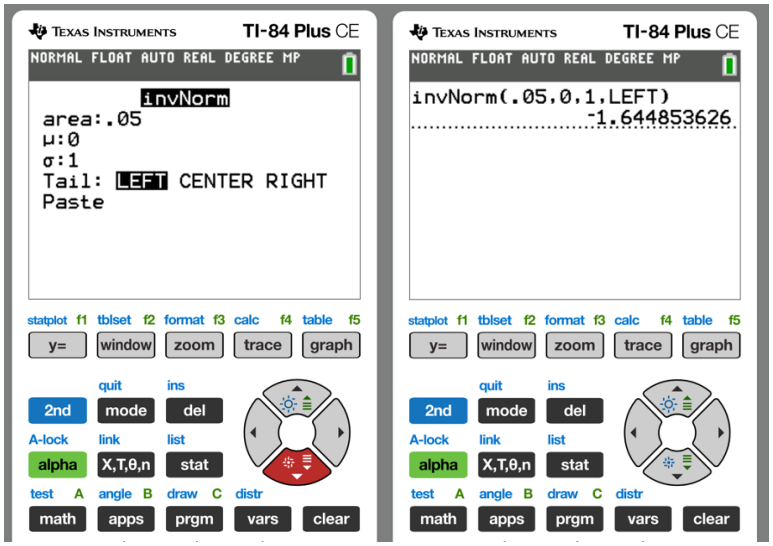
The Sample Does Not Support the Claim

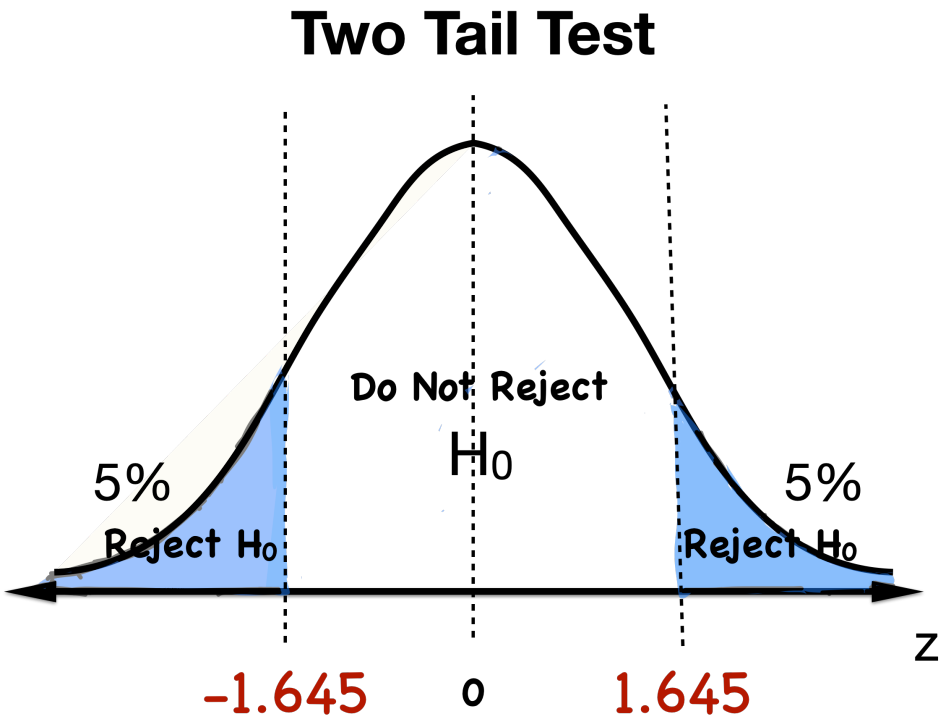
Graduation Rates Men versus Women

The proportion of men who graduate from college within 4 years is not the same as the proportion of women who graduate from college within 4 years. A sample of 120 men reveal that 28 graduated from college within 4 years and a sample of 200 women reveal that 85 graduated from college within 4 years. Use the 10% level of significance to test this claim by the **Traditional Method** and answering the following questions.

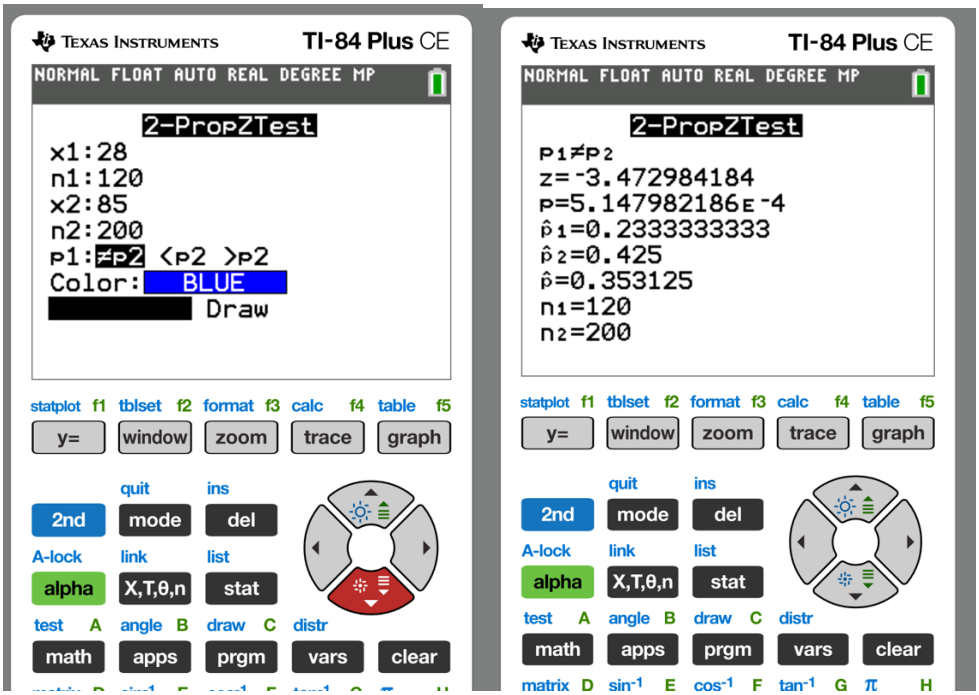
6. What is the claim? $P_1 \neq P_2$ Claim
7. What kind of test is this? **Two Tail Test**
   Two Tail Test, Left Tail Test, or Right Tail Test
8. What is the critical value(s)? **Approximate Hundredths 1.65**
9. What is the test statistic? **Approximate Hundredths -3.47**
10. What is your conclusion? **The Sample Supports The Claim**

$H_0: P_1 = P_2$
$H_1: P_1 \neq P_2$ Claim





Use 2-PropZTest



$z \approx -3.47$

Reject H_0

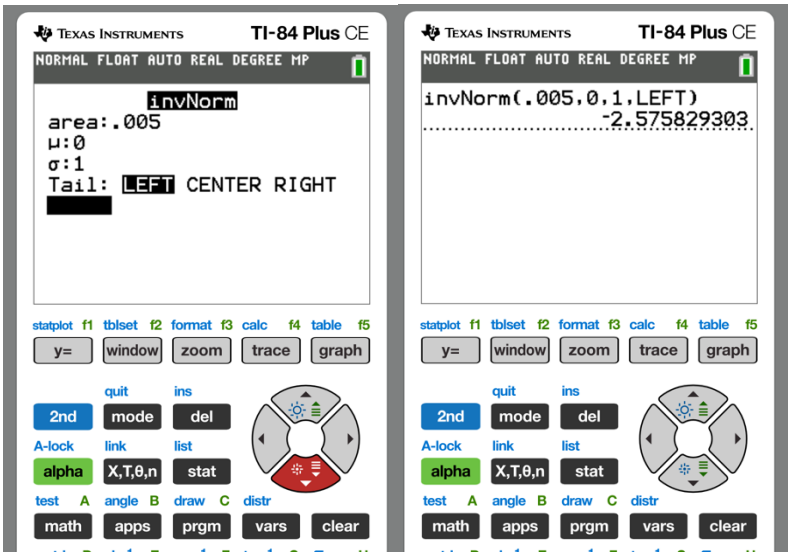
The Sample Support the Claim

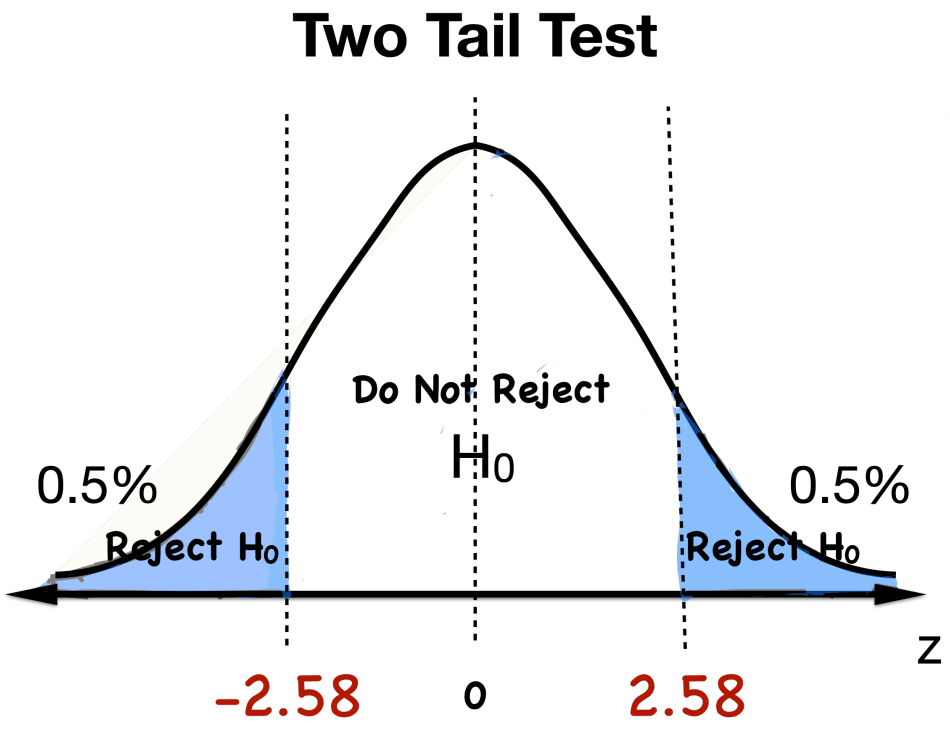
AB705 Data for 2018: Statistic Student Pass Rates for White Students versus Asian Students

The proportion of white students who passed Statistics is the same as the proportion of Asian students who passed Statistics as claimed by campus researchers. A sample of 562 white students reveal that 363 passed Statistics while a sample of 437 Asian students reveal that 314 passed Statistics. Use the 1% level of significance to test this claim by the **Traditional Method** and answering the following questions.

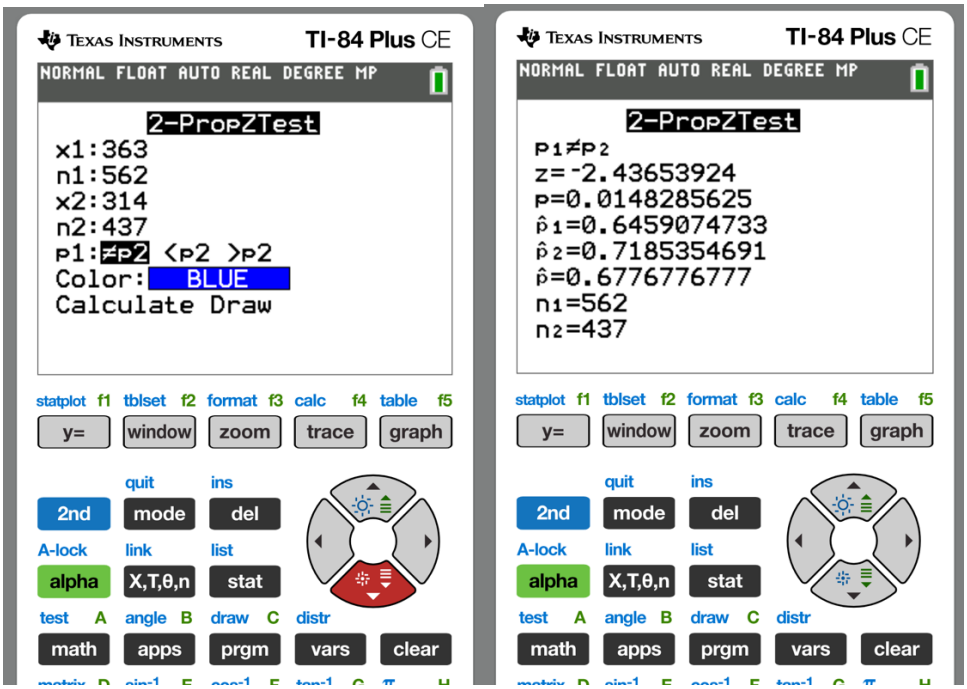
11. What is the claim? $P_1 = P_2$ Claim
12. What kind of test is this? **Two Tail Test**
    Two Tail Test, Left Tail Test, or Right Tail Test
13. What is the critical value(s)? **Approximate Hundredths 2.58**
14. What is the test statistic? **Approximate Hundredths -2.44**
15. What is your conclusion? **The Sample Supports the Claim**

$H_0: P_1 = P_2$ Claim
$H_1: P_1 \neq P_2$





Use 2-PropZTest



$z \approx -2.44$

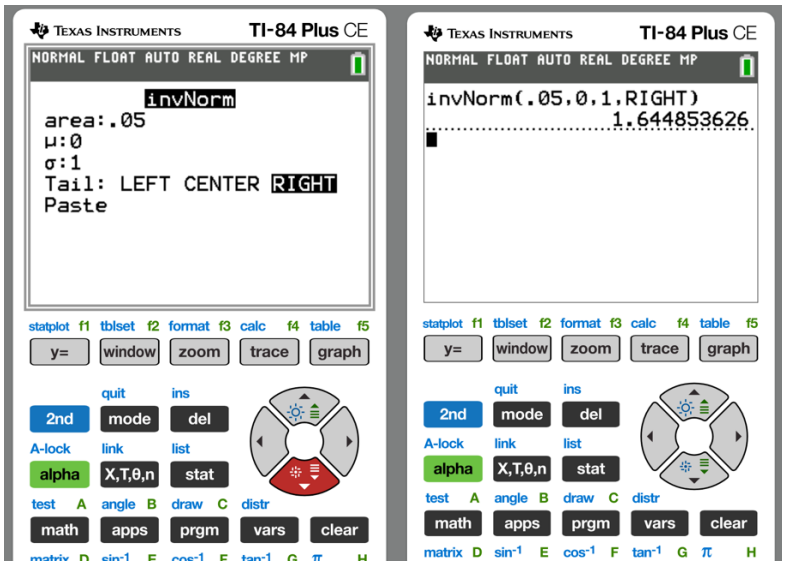
Do Not Reject H_0

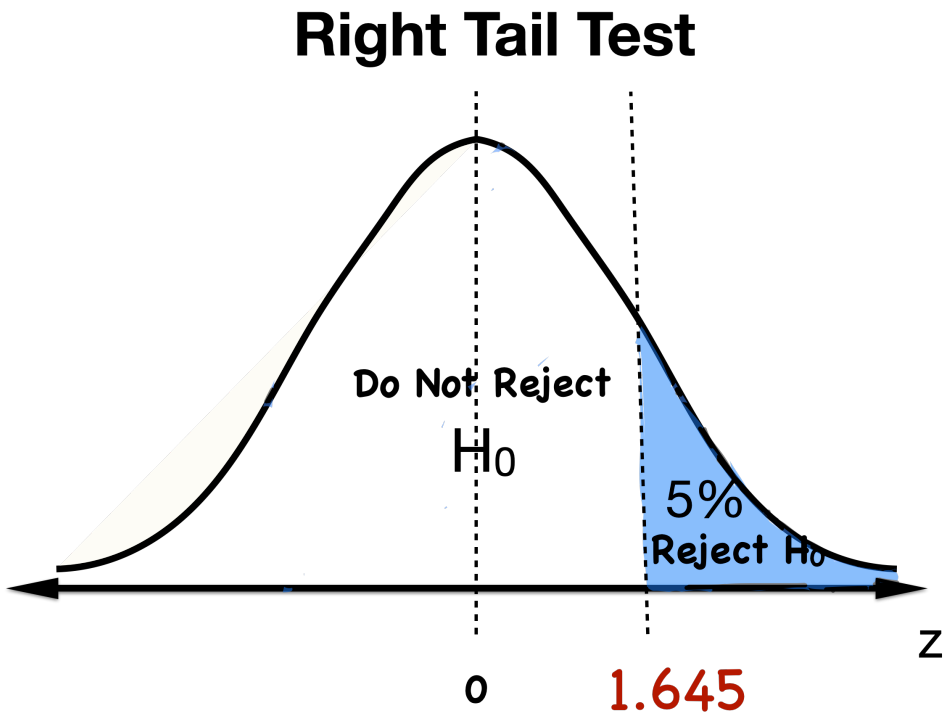
The Sample Support the Claim

AB705 Data for 2018: Statistic Student Pass Rates for Hispanic Students versus Black Students
Hispanic Students were more likely to pass Statistics than Black Students as claimed by campus researchers. A sample of 3956 Hispanic Students reveal that 1903 passed Statistics while a sample of 481 Black students reveal that 281 passed Statistics. Use the 5% level of significance to test this claim by the **P-Value Method** and answering the following questions.

16. What is the claim? $P_1 > P_2$ 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** **1.00**
19. What is the relationship between the p-value and the level of significance? $p \not< \alpha$
    $p < \alpha$ **or** $p \not< \alpha$
20. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: P_1 \leq P_2$
$H_1: P_1 > P_2$ Claim





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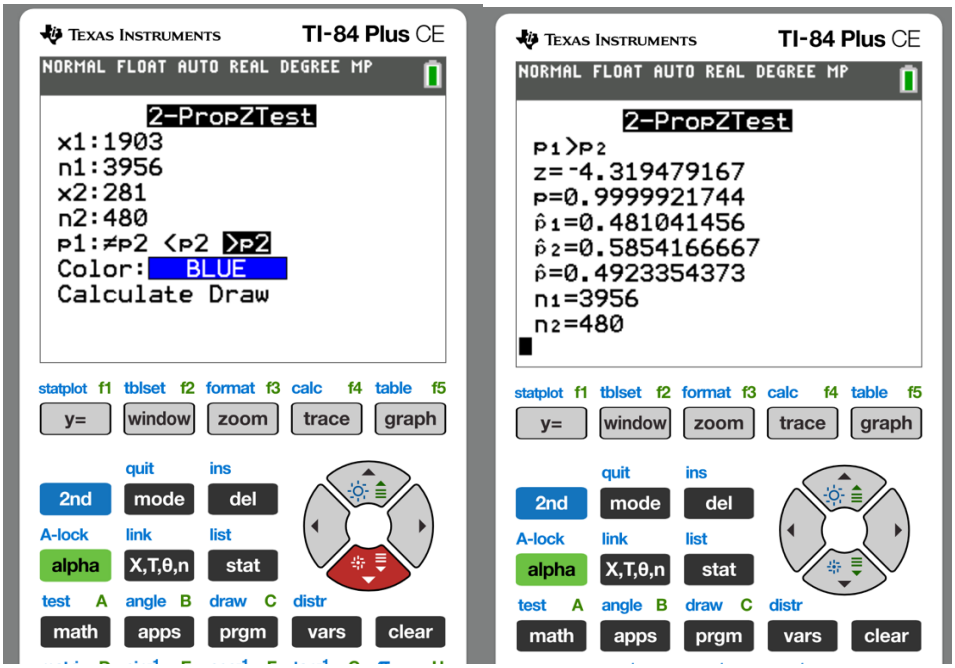


$p \approx 1.00 \not< 0.05$

Accept H_0

The Sample Does Not Support the Claim

Belief in Ghosts: Men versus Women

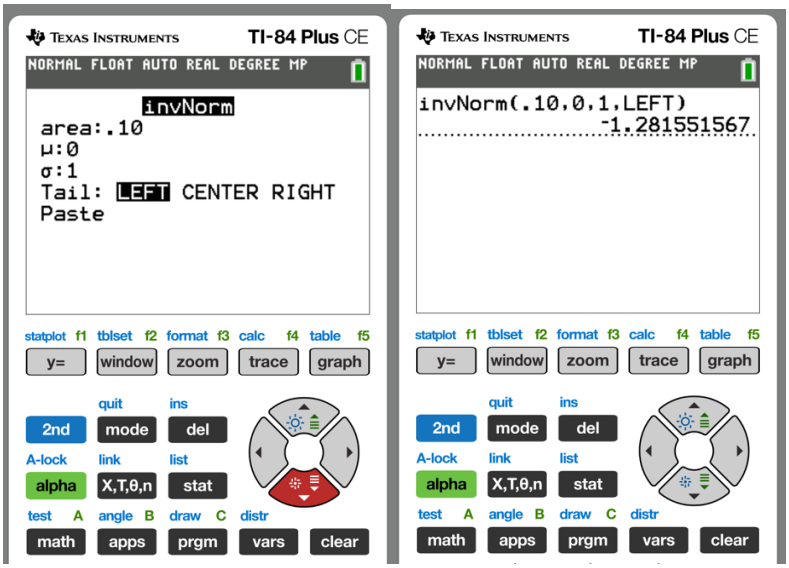
Women are less likely than men to believe in ghosts than men as claimed by the Paranormal Association of America. A sample of 800 women reveal that 155 believe in ghosts while a sample of 650 men reveal that 104 believe in ghost. Use the 10% level of significance to test this claim by the **P-Value Method** and answering the following questions.

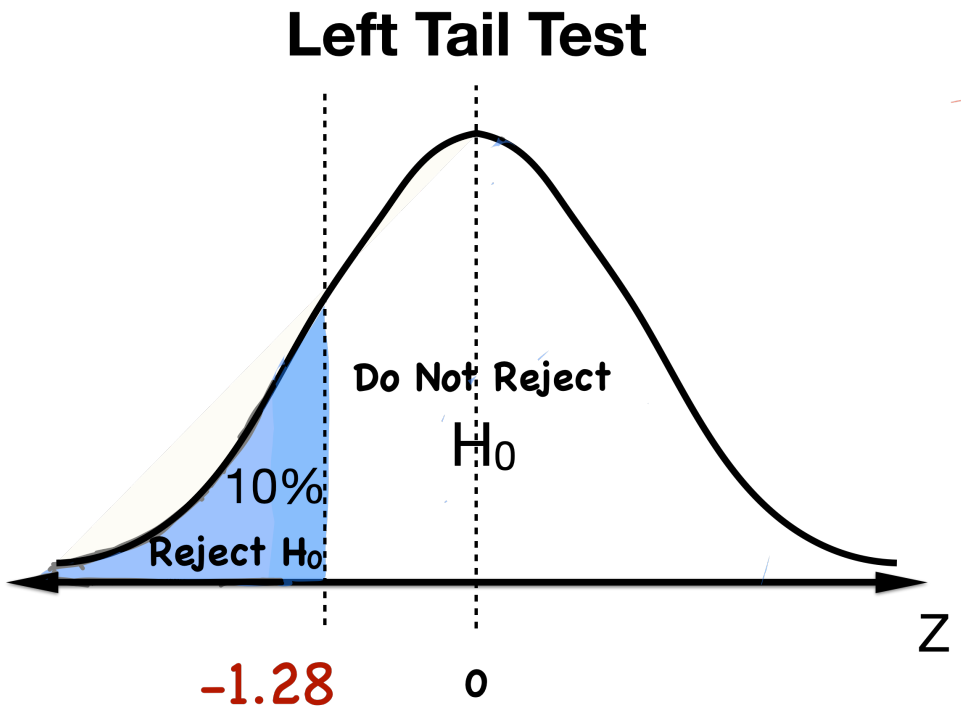
21. What is the claim? $P_1 < P_2$ Claim
22. What kind of test is this? **Left Tail Test**

    Two Tail Test, Left Tail Test, or Right Tail Test
23. What is the p-value? **Approximate Hundredths** **0.95**
24. What is the relationship between the p-value and the level of significance? $p \not< \alpha$

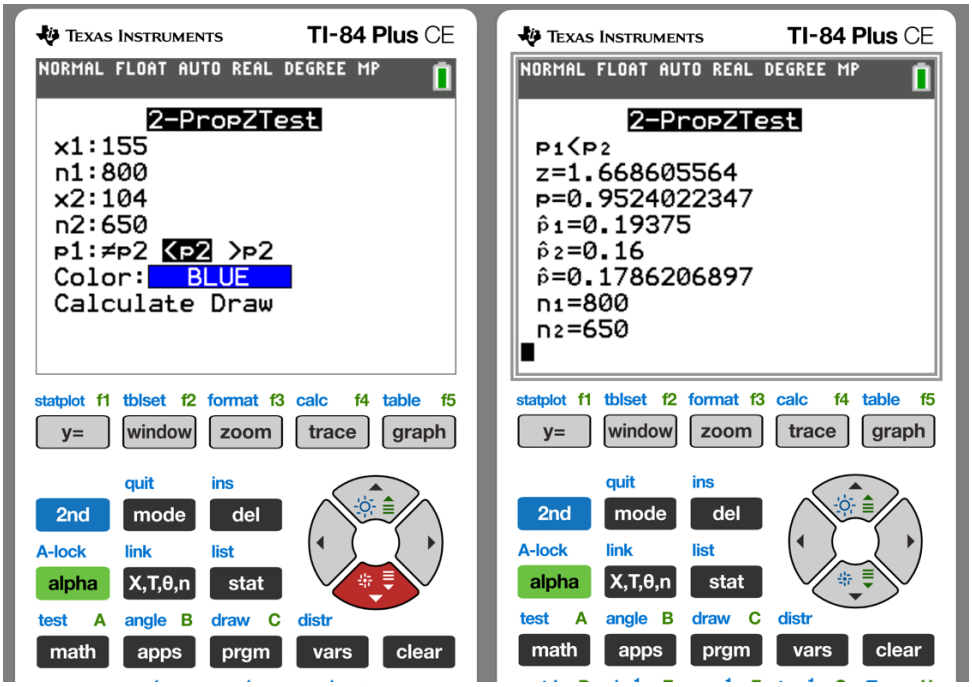
    $p < \alpha$ **or** $p \not< \alpha$
25. What is your conclusion? **The Sample Does Not Support the Claim**

$H_0: P_1 \geq P_2$
$H_1: P_1 < P_2$ Claim





Use 2-PropZTest



$p \approx 0.95 \prec 0.10$

Accept H_0

The Sample Does Not Support the Claim

Adderall and Final Exam Pass Rates

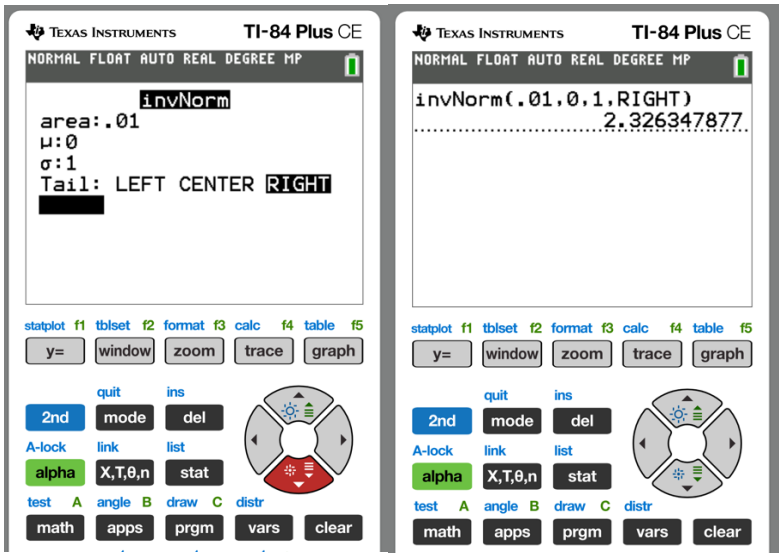
Students who are on Adderall are more likely to pass their final exams than students who are not on Adderall. A sample of 500 students who took Adderall before their final exams reveal that 368 passed their final exams, while 680 students who took a placebo reveal that 404 passed their final exams. Use the 1% level of significance to test this claim by the **P-Value Method** and answering the following questions.

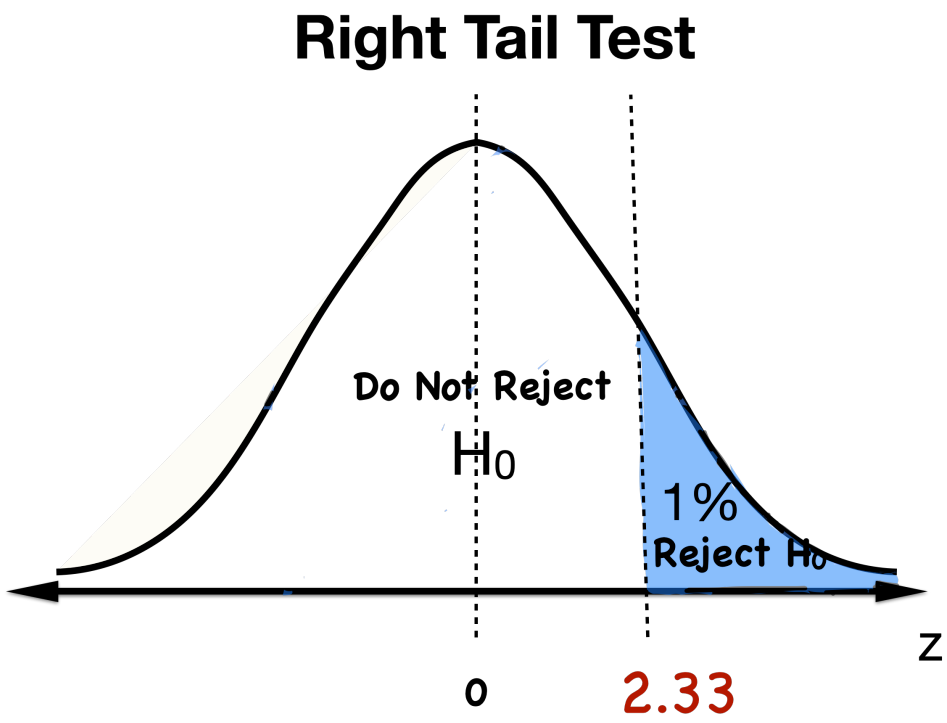
26. What is the claim? $P_1 > P_2$ Claim
27. What kind of test is this? **Right Tail Test**

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

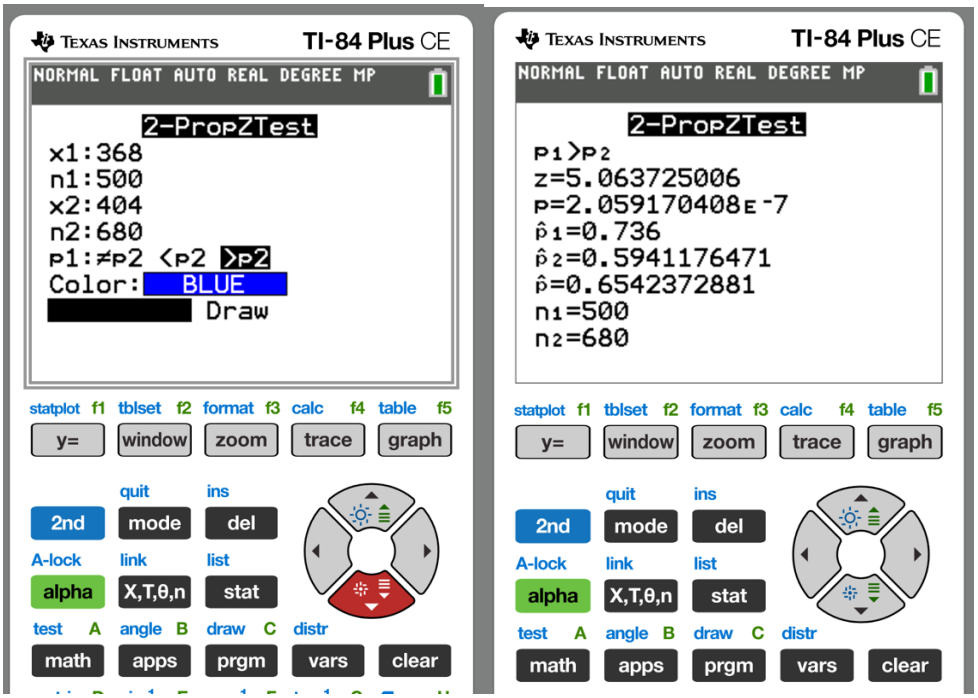
    $p < \alpha$ **or** $p \not< \alpha$
30. What is your conclusion? **The Sample Supports the Claim**

$H_0: P_1 \leq P_2$
$H_1: P_1 > P_2$ Claim





Use 2-PropZTest



$p \approx 0.00 < 0.01$

Accept H_1

The Sample Supports the Claim