# Hypothesis Testing Comparing Two Proportions $P_1$ and $P_2$

## Language

The proportions are the same.
The proportions are not different.
$$P_1 = P_2$$

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

$P_1$ is more likely than $P_2$
$$P_1 > P_2$$

$P_1$ is less likely than $P_2$
$$P_1 < P_2$$

$P_1$ is no more than $P_2$
$$P_1 \leq P_2$$

$P_1$ is at least $P_2$
$$P_1 \leq P_2$$

**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 122 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?
2. What kind of test is this?
   **Two Tail Test, Left Tail Test, or Right Tail Test**
3. What is the critical value(s)? **Approximate Hundredths**
4. What is the test statistic? **Approximate Hundredths**
5. What is your conclusion?

**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?
7. What kind of test is this?
   **Two Tail Test, Left Tail Test, or Right Tail Test**
8. What is the critical value(s)? **Approximate Hundredths**
9. What is the test statistic? **Approximate Hundredths**
10. What is your conclusion?

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**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?
12. What kind of test is this?
    **Two Tail Test, Left Tail Test, or Right Tail Test**
13. What is the critical value(s)? **Approximate Hundredths**
14. What is the test statistic? **Approximate Hundredths**
15. What is your conclusion?

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**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?
17. What kind of test is this?
    **Two Tail Test, Left Tail Test, or Right Tail Test**
18. What is the p-value? **Approximate Hundredths**
19. What is the relationship between the p-value and the level of significance?
$$p < \alpha \text{ or } p \nless \alpha$$
20. What is your conclusion?

**Belief in Ghosts: Men versus Women**
Women are more 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?

    22. What kind of test is this?

        **Two Tail Test, Left Tail Test, or Right Tail Test**

    23. What is the p-value? **Approximate Hundredths**

    24. What is the relationship between the p-value and the level of significance?
$$p < \alpha \text{ or } p \not< \alpha$$

    25. What is your conclusion?

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**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?

    27. What kind of test is this?

        **Two Tail Test, Left Tail Test, or Right Tail Test**

    28. What is the p-value? **Approximate Hundredths**

    29. What is the relationship between the p-value and the level of significance?
$$p < \alpha \text{ or } p \not< \alpha$$

    30. What is your conclusion?