

Two Sample Z Test



Girls_Score
574.0
573.0
622.0
663.0
674.0
569.0
623.0
614.0
640.0
619.0
674.0
612.0
606.0
724.0
707.0
667.0
666.0
639.0
630.0
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638.0
593.0
634.0
665.0
658.0
585.0
593.0
716.0
570.0
599.0

Two Sample Z Test



Boys_Scores
607.0
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606.0
609.0
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617.0
608.0
610.0
612.0
598.0
624.0
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Two Sample Z Test

If on average,
Girls Score 10 marks more
than the Boys ?

Suppose standard
deviation for girls score
100, & boys score is 90



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$$H_0 : \mu_1 - \mu_2 \leq 10$$

$$H_1 : \mu_1 - \mu_2 > 10$$



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Two Sample Z Test

The diagram illustrates the formula for the Two Sample Z Test. The formula is centered, with four green cloud-shaped boxes connected to its components by orange lines. The boxes are: 'Difference bw Sample mean' (top-left), 'Difference bw population mean $\mu_1 - \mu_2$ ' (top-right), 'Population standard deviation σ_1, σ_2 ' (bottom-left), and 'Sample Size n_1, n_2 ' (bottom-right).

Difference bw Sample mean

Difference bw population mean $\mu_1 - \mu_2$

z score =
$$\frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Population standard deviation σ_1, σ_2

Sample Size n_1, n_2

Two Sample Z Test

$$\begin{aligned}\text{z score} &= \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \\ &= \frac{(633.4 - 609) - 10}{\sqrt{100^2/30 + 90^2/30}} \\ &= 0.586 \\ \text{P value} &= 0.278\end{aligned}$$

Two Sample Z Test

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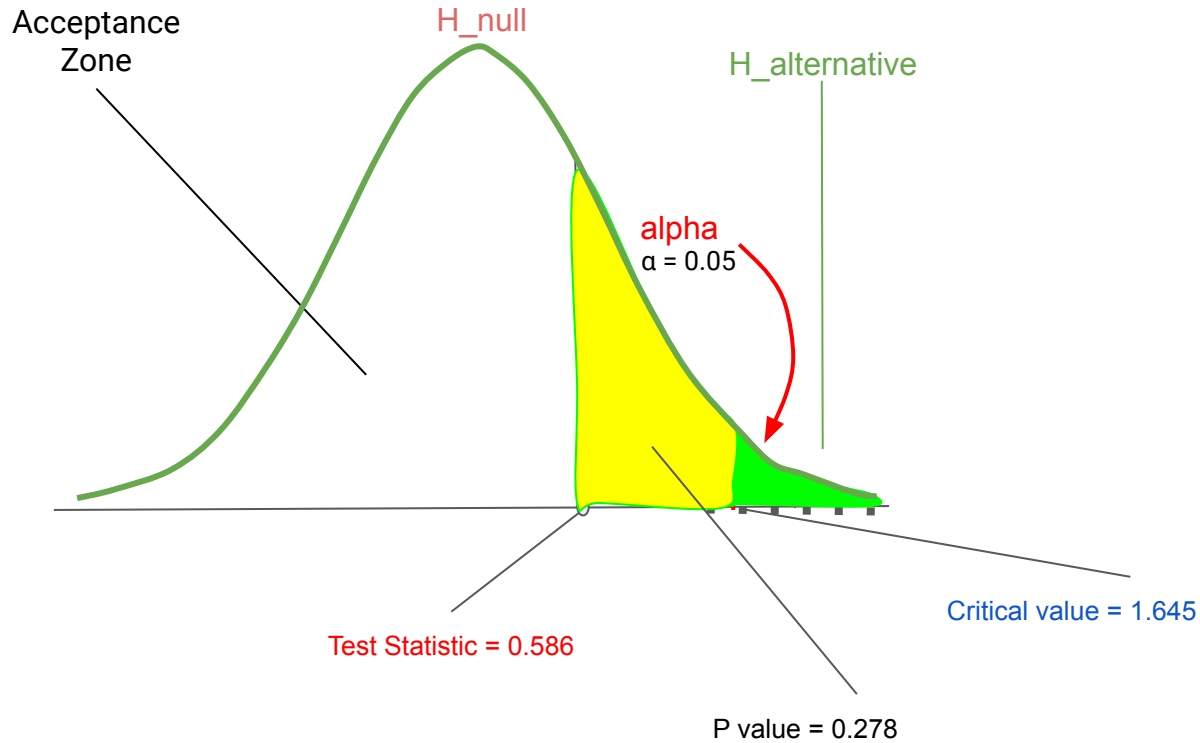
$$\text{P value} = 0.278$$

$$\text{Critical Value} = 1.645$$

$$\text{Z score} < \text{Critical Value}$$

$$\text{P value} > 0.05$$

p-value



Two Sample Z Test

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$$= \frac{(633.4 - 609) - 10}{\sqrt{100^2/30 + 90^2/30}}$$

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$$H_0 : \mu_1 - \mu_2 \leq 10$$

$$H_1 : \mu_1 - \mu_2 > 10$$



One Sample vs Two Sample Z Test

Compare One Population mean
with pre specified value (μ_o)

Compare the difference of Two
Population means with pre
specified value (μ_o, μ_1)

One Sample vs Two Sample Z Test

Compare One Population mean
with pre specified value (μ_o)

Use Known Population Variance of
that Sample in Calculation

Compare the difference of Two
Population means with pre
specified value (μ_o, μ_1)

Use Known Population Variance of
both the population for both the
samples in Calculation

One Sample vs Two Sample Z Test

Compare One Population mean with pre specified value (μ_o)

Use Known Population Variance of that Sample in Calculation

Useful when area of interest is to study one sample

Compare the difference of Two Population means with pre specified value (μ_o, μ_1)

Use Known Population Variance of both the population for both the samples in Calculation

Useful when area of interest is to make comparisons between two samples

Thank You!