



Confidence Interval

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Example:

Predicting the actual share of votes of a particular candidate in the US presidential election.

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Example: US Presidential Election

- Only two candidates, **A** and **B**
- Wish to predict vote percentage for candidate **A**

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- Wish to predict vote percentage for candidate **A**
- A random selection of 500 potential voters surveyed
- 300 voters will vote for **A** and 200 for **B**
- That is, 60% of surveyed voters will vote for **A**

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- Wish to predict vote percentage for candidate **A**
- A random selection of 500 potential voters surveyed
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- That is, 60% of surveyed voters will vote for **A**

Will candidate **A get 60% of all votes in the actual election?**



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Example: US Presidential Election

A 95% confidence interval for the vote share of candidate A,

[55.7%, 64.3%]

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- 95% of similarly constructed confidence intervals likely to have the actual vote share for **A**

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- 95% of similarly constructed confidence intervals likely to have the actual vote share for A
- there is a 0.95 probability that the actual vote share for A will be between 55.7% and 64.3%



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60%

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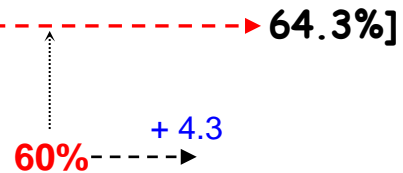
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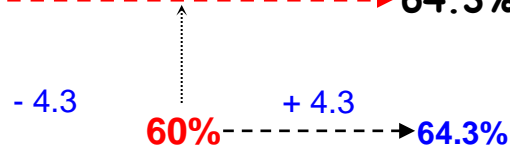
[55.7% ← ————▶ 64.3%]

- 4.3

60%

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60% **64.3%**

- 4.3 + 4.3

The diagram illustrates the calculation of a 95% confidence interval. It shows a central value of 60% in red. To its left, a dashed line with an arrow points to -4.3 in blue. To its right, a dashed line with an arrow points to +4.3 in blue. A vertical dotted line extends upwards from the 60% value to the center of the top interval. The top interval is shown as [55.7% ← ———→ 64.3%] in red, with the endpoints 55.7% and 64.3% also in red.



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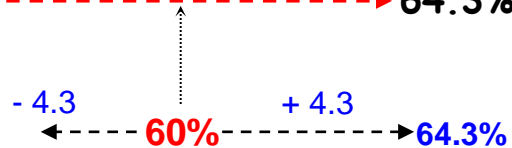


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← - 4.3 60% + 4.3 → 64.3%



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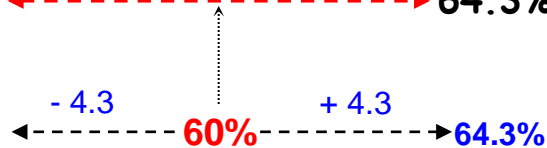
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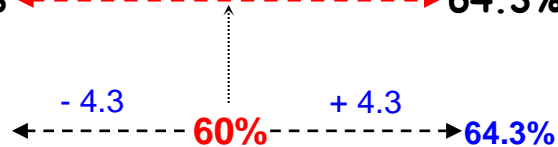


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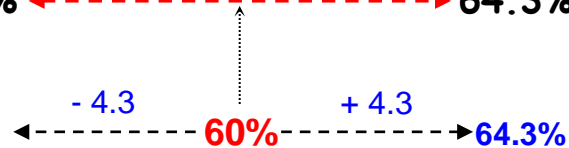


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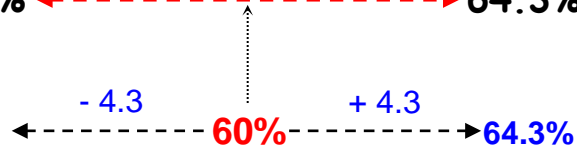


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55.7% ← $- 4.3$ ----- **60%** ----- $+ 4.3$ → 64.3%

+/- 4.3% is the 'Margin of Error'

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What is the average starting salary of ***all business students*** who graduated last year in New York city?

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Population

all students in New York
City who finished their
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Mean = μ

Std = σ

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We wish to find out μ

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Sample

random sample
of 100 students

Mean = \bar{x} = 61,400\$

Std = s = some number

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$$[\text{lower limit} < \mu < \text{upper limit}]$$

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$\bar{x} - \text{margin of error}$ $\bar{x} + \text{margin of error}$