1. Calculate the 95% confidence interval for the true error E

The hypothesis h1 was tested on N=45 instances. The observed error rate E^ = 6.67%.

The number of errors is k = N × E^ = 45 × 0.0667 = 3 errors. Since N is relatively small (N=45) and k is small (k=3), we use the Normal Approximation to estimate the confidence interval for the true error E, assuming the errors follow a Binomial distribution.

The N% confidence interval for the true error ϵ is given by:

E^ +/- Z(N) * root **(**E^(1-E^)/N**)**

For a 95% confidence interval, the two-sided Z(N) value is Z(95) = 1.96.

- E^ = 0.0667
- 1 − E^ = 1 − 0.0667 = 0.9333
- N = 45

The standard error is:

Root(E^(1 - E^)/N **) = Root(**0.0667 * 0.9333 / 45**)**

= Root(0.0622 / 45**)**

= Root(0.001382**)**

= 0.03718

The margin of error is:

Z(95) × Standard Error = 1.96×0.03718
= 0.07287

The 95% confidence interval for the true error E = 0.0667 +/- 0.07287

The interval is from max (0, 0.0667 − 0.07287) to min (1, 0.0667 + 0.07287), because an error rate must be between 0 and 1.

Confidence Interval (CI): **[0%, 13.96%]**