This test is useful when we wish to test whether a mean, μ, is different from a gold standard reference value, μ0. For example, we may wish to test whether a new product is equivalent to an existing, industry standard product. Here, the 'burden of proof', so to speak, falls on the new product; that is, equivalence is actually represented by the alternative, rather than the null hypothesis.

$$H_0 : |\mu - \mu_0| \geq \delta$$
$$H_1 : |\mu - \mu_0| < \delta$$

Formulas

This calculator uses the following formulas to compute sample size and power, respectively:

$$n = \left(\sigma \frac{z_{1-\alpha} + z_{1-\beta/2}}{\delta - |\mu - \mu_0|} \right)^2$$

$$1 - \beta = 2\left[\Phi\left(z - z_{1-\alpha}\right) + \Phi\left(-z - z_{1-\alpha}\right)\right] - 1 \quad , \quad z = \frac{|\mu - \mu_0| - \delta}{\sigma/\sqrt{n}}$$

where

n is sample size
σ is standard deviation
Φ is the standard Normal distribution function
Φ^{-1} is the standard Normal quantile function
α is Type I error
β is Type II error, meaning $1 - \beta$ is power
δ is the testing margin