Population:

$$\sigma^2 = \frac{\sum_{i=1}^{n}(y_i - \mu)^2}{n}$$

Sample:

$$s^2 = \frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n-1}$$

PQs:

$$Z = \frac{\bar{Y} - \mu}{\sigma/\sqrt{n}} \sim G(0,1)$$

$\bar{Y}$: sample mean
σ: population stddev
μ: population mean

CI: $\bar{y} \pm a\sigma/\sqrt{n}$

$$T = \frac{\bar{Y} - \mu}{s/\sqrt{n}} \sim t(n-1)$$

$\bar{Y}$: sample mean
s: sample stddev
μ: population mean

CI: $\bar{y} \pm as/\sqrt{n}$

$$U = \frac{(n-1)s^2}{\sigma^2} \sim \chi^2(n-1)$$

CI: $\left[\frac{(n-1)s^2}{b}, \frac{(n-1)s^2}{a}\right]$: $p = P(a \le U \le b)$

For future observations:

PQ: $\frac{Y - \bar{Y}}{s\sqrt{1 + 1/n}} \sim t(n-1)$

CI: $\bar{y} \pm as\sqrt{1 + 1/n}$

$$P(|Z| \ge k) = 2 - 2P(Z \le k)$$

$$P(|Z| \le k) = 2P(Z \le k) - 1$$

$$\Gamma(\alpha) = \int_0^\infty e^{-x} x^{\alpha-1}\, dx = (\alpha - 1)!$$

$100p\%$ CI: $P(a \le Z \le a) = p$

is equal to a $100q\%$ LI, where $q = e^{-a^2/2}$

$100q\%$ LI : $\{\theta : R(\theta) \geq q)$

is equal to a $100p\%$ CI, where $p = 2P(Z \leq \sqrt{-2\log(q)}) - 1$

95% CI $\approx$ 15% LI