A confidence interval (CI) gives a plausible range for a **population** parameter p by using outcomes from a sample
$(1-\alpha)100\%$ two-sided CI finds LB and UB such that $\boldsymbol{P(LB \leq p \leq UB) = 1-\alpha}$ and the CI is denoted by (LB, UB)
$(1-\alpha)100\%$ one-sided lower bound CI finds LB such that $\boldsymbol{P(LB \leq p) = 1-\alpha}$ and the CI is denoted by (LB, ∞)
$(1-\alpha)100\%$ one-sided upper bound CI finds LB such that $\boldsymbol{P(p \leq UB) = 1-\alpha}$ and the CI is denoted by $(-\infty, UB)$

Given: $X_1, X_2, \dots, X_n$ are random samples i.e. they are **independent and identically distributed**

Assumption	X_i's are from a **normal distribution** with unknown mean and **known** variance	X_i's are from **any distribution** with unknown mean and unknown variance and n>40	X_i's are from **normal distribution** with unknown mean and unknown variance and n<40
Population parameter to be estimated	Mean	Mean	Mean
$(1-\alpha)100\%$ two-sided confidence interval	$\left(\bar{x} - z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}, \bar{x} + z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}\right)$	$\left(\bar{x} - z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}, \bar{x} + z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}\right)$	$\left(\bar{x} - t_{\frac{\alpha}{2},n-1} \frac{s}{\sqrt{n}}, \bar{x} + t_{\frac{\alpha}{2},n-1} \frac{s}{\sqrt{n}}\right)$
Sample size for CI of width w	$\left(\frac{2z_{\alpha/2}\sigma}{w}\right)^2$	$\left(\frac{2z_{\alpha/2}s}{w}\right)^2$	N/A
$(1-\alpha)100\%$ one-sided upper bound CI	$\left(-\infty, \bar{x} + z_{\alpha} \frac{\sigma}{\sqrt{n}}\right)$	$\left(-\infty, \bar{x} + z_{\alpha} \frac{s}{\sqrt{n}}\right)$	$\left(-\infty, \bar{x} + t_{\alpha,n-1} \frac{s}{\sqrt{n}}\right)$
$(1-\alpha)100\%$ one-sided lower bound CI	$\left(\bar{x} - z_{\alpha} \frac{\sigma}{\sqrt{n}}, \infty\right)$	$\left(\bar{x} - z_{\alpha} \frac{s}{\sqrt{n}}, \infty\right)$	$\left(\bar{x} - t_{\alpha,n-1} \frac{s}{\sqrt{n}}, \infty\right)$