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

A confidence interval (CI) gives a plausible range for a **population** parameter p by using outcomes from a sample

A prediction interval (PI) gives a plausible range for a **single future prediction value**

A tolerance interval (TI) gives a plausible range which **contains at least k%** of the entire population

Assumption	X_i's are from **normal distribution** with unknown mean and unknown variance	X_i's are from **normal distribution** with unknown mean and unknown variance	X_i's are from **normal distribution** with unknown mean and unknown variance and n<40
Interval	Confidence interval on population variance	Prediction interval for X of a single individual	Tolerance interval containing at least k% of population
Notations	n: sample size $\chi^2_{\alpha,n-1}$: chi-squared value for α significance with n-1 df s: sample standard deviation	$\bar{x}$: sample mean n: sample size s: sample standard deviation $t_{\frac{\alpha}{2},n-1}$: t-value, α/2 sig, n-1 df	$\bar{x}$: sample mean n: sample size s: sample standard deviation $C_{\alpha,k}$: C-value, α sig, k of pop
$(1-\alpha)100\%$ two-sided interval	Lower limit: $(n-1)s^2/\chi^2_{\frac{\alpha}{2},n-1}$ Upper limit: $(n-1)s^2/\chi^2_{1-\frac{\alpha}{2},n-1}$	Lower limit: $\bar{x} - t_{\frac{\alpha}{2},n-1}\, s\sqrt{1+\frac{1}{n}}$ Upper limit: $\bar{x} + t_{\frac{\alpha}{2},n-1}\, s\sqrt{1+\frac{1}{n}}$	Lower limit: $\bar{x} - C_{\alpha,k}s$ Upper limit: $\bar{x} + C_{\alpha,k}s$ (two-sided C values)
$(1-\alpha)100\%$ one-sided upper bound interval	Lower limit: $-\infty$ Upper limit: $(n-1)s^2/\chi^2_{1-\alpha,n-1}$	Lower limit: $-\infty$ Upper limit: $\bar{x} + t_{\alpha,n-1}\, s\sqrt{1+\frac{1}{n}}$	Lower limit: $-\infty$ Upper limit: $\bar{x} + C_{\alpha,k}s$ (one-sided C value)
$(1-\alpha)100\%$ one-sided lower bound interval	Lower limit: $(n-1)s^2/\chi^2_{\alpha,n-1}$ Upper limit: $+\infty$	Lower limit: $\bar{x} - t_{\alpha,n-1}\, s\sqrt{1+\frac{1}{n}}$ Upper limit: $+\infty$	Lower limit: $\bar{x} - C_{\alpha,k}s$ Upper limit: $+\infty$