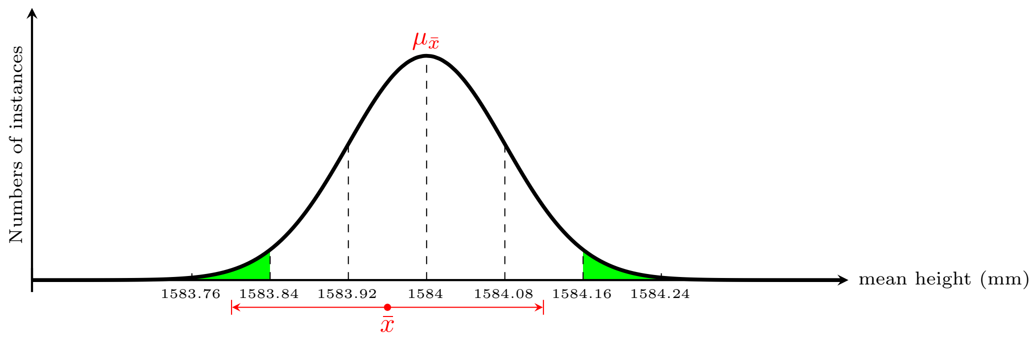
Again, we will only have to calculate these for *'confidence levels'* of 95%, so as explained before, the *'critical value'* will approximate to 2 (corresponding to 2σ, a *'z-score'* ≈ 2.)[liii]

$$95\% \text{ C.I. } \left[\bar{x} - (1.96)\frac{\sigma}{\sqrt{n}},\ \bar{x} + (1.96)\frac{\sigma}{\sqrt{n}}\right]$$

EXAMPLE:
A furniture manufacturer gets a massive contract with a global retail company to produce 10,000 chairs of a specific design, to be sold in various different branches internationally. The manufacturer makes 10,000 chairs and is ready to ship them out. The heights of the chairs are normally distributed with mean 1584mm and a standard deviation of 0.8mm. If 100 chairs were taken from the *'population'* of all chairs, what is the *'confidence interval'* of the *'mean'* of that *'sample'* (*'sample mean'*), to a *'confidence level'* of 95%, given that the *'sample mean'* is $\bar{x} = 1583.96$mm?

We can sketch the *'sampling distribution'* as follows, calculating $\sigma_{\bar{x}}$ from $\frac{\sigma}{\sqrt{n}} = \frac{0.8mm}{\sqrt{100}} = \frac{0.8mm}{10} =$ 0.08mm. (Remember the *'central limit theorem'*?)



$$\begin{aligned} \text{'Maximum margin of error'} &= (1.96)\frac{\sigma}{\sqrt{n}} \quad \text{(at a 'confidence level' of 95\%)} \\ &= (1.96)\frac{0.8\text{mm}}{\sqrt{100}} \\ &= \frac{1.568\text{mm}}{10} \\ &= 0.1568\text{mm} \end{aligned}$$

$$95\% \text{ C.I. } \left[\bar{x} - (1.96)\frac{\sigma}{\sqrt{n}}, \bar{x} + (1.96)\frac{\sigma}{\sqrt{n}}\right]$$

$$\implies \quad 95\% \text{ C.I. } [1583.96\text{mm} - 0.1568\text{mm}, 1583.96\text{mm} + 0.1568\text{mm}]$$

$$\implies \quad 95\% \text{ C.I. } [1583.8032\text{mm}, 1584.1168\text{mm}]$$

(You can also write the answer as: 1583.96 ± 0.1568mm, at a *'confidence level'* of 95%.)

[liii] Also as mentioned before, if we were being more accurate, we would use $z^* = 1.96$.