

3.4) Usando las funciones de excel DISTR.NORM.ESTAND & INVERSE.

Tabla 3.1:

Centred on mean	$\pm \sigma$	$\pm 1.65\sigma$	$\pm 2\sigma$	$\pm 2.58\sigma$	$\pm 3\sigma$
Measurements within range	68%	90%	95%	99.0%	99.7%
Measurements outside range	82%	10%	5%	1.0%	0.3%
a)	1 in 3	1 in 10	1 in 20	1 in 200	1 in 400

$$\text{i) } P(-4 \leq X \leq 4) = \int_{-4}^{4} \frac{1}{\sigma \sqrt{2\pi}} \exp\left\{-\frac{(x-\bar{x})^2}{2\sigma^2}\right\} dx$$

$$1 - 2 \int_0^4 \frac{1}{\sigma \sqrt{2\pi}} \exp\left\{-\frac{(x-\bar{x})^2}{2\sigma^2}\right\} dx = 1 - 0.999937 = \underline{\underline{0.000063}}$$

$$\Rightarrow 0.000063 = \frac{1}{15173} \Rightarrow \text{outside range } \underline{\underline{\pm 4\sigma}} \text{ or } 0.0063\%$$

$$\text{ii) } 1 - 2 \int_0^{\infty} \text{PdF}(x) dx = 1 - 0.99999943 = \underline{\underline{0.00000057}}$$

$$= 70.00000057 = \frac{1}{1754386} \Rightarrow \text{outside range } \underline{\underline{\pm 5\sigma}} \text{ or } 0.000057\%$$

b) $\pm 2\sigma$

$$\text{i) } \int_0^{\infty} \text{PdF}(x) dx = 0.5 \Rightarrow z \approx 0.67 \Rightarrow \underline{\underline{\pm 0.67\sigma}}$$

$$\text{ii) } \int_0^{2\sigma} \text{PdF}(x) dx = 1 - 0.999 = \Rightarrow z \approx 3.29 \Rightarrow \underline{\underline{\pm 3.29\sigma}}$$