Chebysghev inequality claims the following: Let F be non-negative function, and

$$M_a = \{x: \quad F(x) \geq a\},$$

where $a > 0$. Then one can see that

$$\mu(M_a) = \int_{M_a} dx \leq \int_{M_a} \frac{F(x)}{a} dx = \frac{1}{a} \int_{M_a} F(x)dx \leq \frac{1}{a} \int_{-\infty}^{\infty} F(x)dx \leq$$

(we asssume that all integrals exist.)

This inequality seems to be one almost evidnet and highly effective.

Corollary.

Let random variable ξ has average μ, and dispersion σ:

$$A = \mu, \quad \sqrt{< \Delta A^2 >} = \sqrt{< A^2 > - < A >^2} = \sigma.$$

Then

$$P(|\xi - \mu| > a) \leq \frac{\sigma^2}{a^2}.$$

`Proof`

$$P(|\xi - \mu| > a) \leq \int \frac{(x-\mu)^2}{a^2} \rho(x)dx = \frac{\sigma^2}{a^2}.$$