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15.3.4 Variance and Standard Deviation

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Another common property of a random variable is its variance, σ_x^2, which is defined as,

$$\sigma_x^2 \equiv E\left[(X-\mu_x)^2\right] \equiv \int_{-\infty}^{\infty}(x-\mu_x)^2 f(x)\,\mathrm{d}x \tag{15.17}$$

Note, σ_x (i.e. without the square) is commonly referred to as the standard deviation (of X).

For a sample statistic, an unbiased estimate of σ_x^2 is the sample variance s_x^2,

$$s_x^2 \equiv \frac{1}{N-1}\sum_{i=0}^{N-1}(x_i-\overline{x})^2 \tag{15.18}$$

Note the factor of $1/(N-1)$ as opposed to the $1/N$ which

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