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## CHAPTER 5

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# Correlation and linear regression

## 5.1 Correlation

Let  $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$  represent  $n$  points on a scatterplot. Then the **correlation coefficient**, denoted by  $r$ , is the average of the products of the  $z$ -scores, except that we divide by  $n - 1$  instead of  $n$ . That is

$$r = \frac{1}{n - 1} \sum_{i=1}^n \left( \frac{x_i - \bar{x}}{s_x} \right) \left( \frac{y_i - \bar{y}}{s_y} \right) \quad (5.1)$$

where  $s_x$  and  $s_y$  are the standard deviation for  $x$  and  $y$  respectively.

Equivalently, the correlation coefficient can be given as

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

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**Brendan G. Carr**



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*Fields, Forces, and Flows in Biological Systems* Alan J Grodzinsky, 2011-03-08 Fields Forces and Flows in Biological Systems describes the fundamental driving forces for mass transport electric current and fluid flow as they apply to the biology and biophysics of molecules cells tissues and organs Basic mathematical and engineering tools are presented in the context of biology and physiology The chapters are structured in a framework that moves across length scales from molecules to membranes to tissues Examples throughout the text deal with applications involving specific biological tissues cells and macromolecules In addition a variety of applications focus on sensors actuators diagnostics and microphysical measurement devices e g bioMEMs NEMs microfluidic devices in which transport and electrokinetic interactions are critical This textbook is written for advanced undergraduate and graduate students in biological and biomedical engineering and will be a valuable resource for interdisciplinary researchers including biophysicists physical chemists materials scientists and chemical electrical and mechanical engineers seeking a common language on the subject

*Optical Measurements, Modeling, and Metrology, Volume 5* Tom Proulx, 2025-08-07 Optical Measurements Modeling and Metrology represents one of eight volumes of technical papers presented at the Society for Experimental Mechanics Annual Conference on Experimental and Applied Mechanics held at Uncasville Connecticut June 13 16 2011 The full set of proceedings also includes volumes on Dynamic Behavior of Materials Mechanics of Biological Systems and Materials Mechanics of Time Dependent Materials and Processes

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[Revue Roumaine de Physique](#), 1988 **Order and Fluctuations in Equilibrium and Nonequilibrium Statistical**

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**Optica Applicata**, 1979      **American Journal of Physics**, 1978      **Neutrons, X-rays and Light: Scattering**

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