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Event; 3.5 Conditional and Independent Events; Problems; 4 Probability Distributions and Transformations; 4.1 Probability Distributions; 4.2 Expected Value; 4.3 Variance; 4.4 Joint Distributions; 4.5 Covariance; 4.6 Chebyshev's Inequality; 4.7 Transformations of Random Variables; 4.8 Bayes' Theorem; Problems; 5 Discrete Distributions; 5.1 Introduction; 5.2 Discrete Uniform Distribution; 5.3 Bernoulli Distribution; 5.4 Binomial Distribution; 5.5 Poisson Distribution; 5.6 Hypergeometric Distribution; 5.7 Geometric Distribution; 5.8 Negative Binomial Distribution; Problems; 6 Continuous Distributions; 6.1 Introduction; 6.2 Continuous Uniform Distribution; 6.3 Normal Distribution; 6.4 Central Limit Theorem; 6.5 Normal Approximation to the Binomial Distribution; 6.6 Gamma Distribution; 6.7 Exponential Distribution; 6.8 Chi-Square Distribution; 6.9 Student's t-Distribution; 6.10 F Distribution; 6.11 Lognormal Distribution; 6.12 Beta Distribution; Problems; 7 Parameter and Interval Estimation; 7.1 Introduction; 7.2 Random and Systematic Errors; 7.3 Terminology and Notation; 7.4 Estimator Properties; 7.5 Interval Estimation of Parameters; 7.5.1 Interval Estimation for Population Mean; 7.5.2 Interval Estimation for the Proportion of Population; 7.5.3 Estimated Error; 7.5.4 Interval Estimation for Poisson Rate Parameter; 7.6 Parameter Differences for Two Populations; 7.6.1 Difference in Means; 7.6.1.1 Case 1: μ_1 and μ_2 Known; 7.6.1.2 Case 2: μ_1 and μ_2 Unknown, but Equal ($=$); 7.6.1.3 Case 3: μ_1 and μ_2 Unknown and Unequal; 7.6.2 Difference in Proportions; 7.7 Interval Estimation for a Variance; 7.8 Estimating the Ratio of Two Variances; 7.9 Maximum Likelihood Estimation; 7.10 Method of Moments; Problems; 8 Propagation of Error; 8.1 Introduction; 8.2 Error Propagation; 8.3 Error Propagation Formulas; 8.3.1 Sums and Differences; 8.3.2 Products and Powers; 8.3.3 Exponentials; 8.3.4 Variance of the Mean; 8.4 A Comparison of Linear and Exact Treatments; 8.5 Delta Theorem; Problems; 9 Measuring Radioactivity; 9.1 Introduction; 9.2 Normal Approximation to the Poisson Distribution; 9.3 Assessment of Sample Activity by Counting; 9.4 Assessment of Uncertainty in Activity; 9.5 Optimum Partitioning of Counting Times

Sommario/riassunto

This statistics textbook, with particular emphasis on radiation protection and dosimetry, deals with statistical solutions to problems inherent in health physics measurements and decision making. The authors begin with a description of our current understanding of the statistical nature of physical processes at the atomic level, including radioactive decay and interactions of radiation with matter. Examples are taken from problems encountered in health physics, and the material is presented such that health physicists and most other nuclear professionals will more readily understand the app