An Algebra-Based Proof of Chebyshev's Inequality

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Introduction to Probability and Statistics, and Mathematical Statistics courses at Delaware County Community College have only Algebra prerequisites. Relatively early in those courses, students are presented with Chebyshev's Inequality: Let *x* be a random variable with finite mean μ and variance σ^2. Then in the distribution of *x*, at least $(1-\frac{1}{k^2})100\%$ of the data lie within *k* standard deviations of the mean, where *k* is any number greater than 1. That is, $\mathrm{P}(\mu - k\sigma \le x \le \mu + k\sigma) \ge 1 - \frac{1}{k^2}$ where $k > 1$. The author has found no algebra-based book that offers a proof of this inequality. One such proof is discussed in this article.

Sid Kolpas is beginning his 43rd full-time year of teaching. His interests include teacher education, the use of technology in the classroom, mathematics history, mathematically based magic tricks, and antiquarian books.