

Please attempt these problems WITHOUT using the Statistics features of your calculator. You may use a scientific calculator.

Problem 1. (Archaeology: Ireland)

The Hill of Tara in Ireland is a place of great archaeological importance. This region has been occupied by people for more than 4,000 years. Geomagnetic surveys detect subsurface anomalies in the earth's magnetic field. These surveys have led to many significant archaeological discoveries. After collecting data, the next step is to begin a statistical study. The following data measure magnetic susceptibility (centimeter-gram-second $\times 10^{-6}$) on two of the main grids of the Hill of Tara.

Grid E: x variable

13.20	5.60	19.80	15.05	21.40	17.25	27.45
16.95	23.90	32.40	40.75	5.10	17.75	28.35

Grid H: y variable

11.85	15.25	21.30	17.30	27.50	10.35	14.90
48.70	25.40	25.95	57.60	34.35	38.80	41.00
31.25						

(a) Compute Σx , Σx^2 , Σy , Σy^2 .

(b) Use the results of part (a) to compute the sample mean, variance, and standard deviation for x and for y .

(c) Compute a 75% Chebyshev interval around the mean for x values and also for y values. Use the intervals to compare the magnetic susceptibility on the two grids. Higher numbers indicate higher magnetic susceptibility. However, extreme values, high or low, could mean an anomaly and possible archaeological treasure.

(d) Compute the sample coefficient of variation for each grid. Use the CV's to compare the two grids. If s represents variability in the signal (magnetic susceptibility) and \bar{x} represents the expected level of the signal, then s/\bar{x} can be thought of as a measure of the variability per unit of expected signal. Remember, a considerable variability in the signal (above or below average) might indicate buried artifacts. Why, in this case, would a large CV be better, or at least more exciting? Explain.

Problem 2. A data set has a mean of $\bar{x} = 80$ and a standard deviation of $s = 4$. Use Chebechev's Theorem to find the minimum percentage of the data lying in the range 60 to 100.