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Practice Problems: Exercise 3 – Microengineering 110

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1. Exposure to microbial products, especially endotoxin, may have an impact on vulnerability to allergic diseases. The following data on concentration (EU/mg) in settled dust for one sample of urban homes and another of farm homes was obtained:

U: 6.0 5.0 11.0 33.0 4.0 5.0 80.0 18.0 35.0 17.0 23.0

F: 4.0 14.0 11.0 9.0 9.0 8.0 4.0 20.0 5.0 8.9 21.0 9.2 3.0 2.0 0.3

- Determine the sample mean for each sample. How do they compare?
- Determine the sample median for each sample. How do they compare? Why is the median for the urban sample so different from the mean for that sample?
- Calculate the trimmed mean for each sample by deleting the smallest and largest observation. What are the corresponding trimming percentages? How do the values of these trimmed means compare to the corresponding means and medians?

2. Poly(3-hydroxybutyrate) (PHB), a semicrystalline polymer that is fully biodegradable and biocompatible, is obtained from renewable resources. From a sustainability perspective, PHB offers many attractive properties though it is more expensive to produce than standard plastics. The accompanying data on melting point (°C) for each of 12 specimens of the polymer using a differential scanning calorimeter was obtained:

180.5 181.7 180.9 181.6 182.6 181.6 181.3 182.1 182.1 180.3 181.7 180.5

Compute the following:

a. The sample range

b. The sample variance s^2

c. The sample standard deviation

3. Four universities—1, 2, 3, and 4—are participating in a holiday basketball tournament. In the first round, 1 will play 2 and 3 will play 4. Then the two winners will play for the championship, and the two losers will also play. The outcome is listed as the rank order of the teams at the end of the tournament. One possible outcome can be denoted by 1324 (1 beats 2 and 3 beats 4 in first-round games, and then 1 beats 3 and 2 beats 4).

- List all outcomes in S .
- Let A denote the event that 1 wins the tournament. List outcomes in A .
- Let B denote the event that 2 gets into the championship game. List outcomes in B .