

## Coefficient of Variation

The Coefficient of Variation (CV) is a ratio of the standard deviation of a data set to its mean value. It allows us to compare variation for data sets with different mean values.

The formula for calculating the Coefficient of Variation a sample is

$$CV = 100 \times \frac{Sx}{\bar{x}}$$

We multiply by 100 to express the CV as a percent.

One way to use the Coefficient of Variation is to compare different data sets with different means for consistency. The data set with the lower CV is more consistent.

Example: John wanted to know which of the two routes he usually takes to work is a more consistent commute. He found that the freeway route took an average of 32 minutes with a standard deviation of 3.9 minutes. The expressway commute took an average of 36 minutes with a standard deviation of 4.1 minutes. Which route is the more consistent commute? Why?

Because these two routes have a different mean value, you cannot just look at the standard deviation. We need to “normalize” the deviation by using the Coefficient of Variation.

$$CV_{Freeway} = 100 \times \frac{3.9 \text{ min}}{32 \text{ min}} \approx 12.2\%$$

$$CV_{Expressway} = 100 \times \frac{4.1 \text{ min}}{36 \text{ min}} \approx 11.4\%$$

Because it has a lower CV, the expressway commute is more consistent.