## Video 6 Standard Deviation

1. In comparing monthly precipitation for Portland, Oregon, and Montreal, Canada, why was comparing the mean monthly precipitation rates insufficient? Both Canada's and Portland's monthly precipitation rates are almost the same, but the two cities have two very different climates. Measure of center does not provide all the information. The average are about the same, but their weather patterns are different.

2. Why don't we measure spread about the mean by simply averaging x x −, the deviations of individual data values from their mean? Standard deviation measures how for the sales figures differ from the mean. If we subtract the mean from each from each period sales, we see how far each observation deviates from the mean. Some of the deviations are positive and some are negative. They always sum up to 0.

3. What did the standard deviation of four-week sales data tell you about the two Wahoo's Taco locations, Manhattan Beach and South Coast Plaza? South Coast Plaza is stable and symmetrical from period to period without any big swings up or down. Manhattan Beach's store sales varies more widely.

4. Can the standard deviation of a set of observations be s = −1.5? Explain It doesn't. The deviations sum up to 0 or when it's squared, it makes them positive.

## Video 7 Normal Curves

1. Describe the characteristic shape of a normal curve. A normal curve is symmetric with one peak, what people call bell shaped.

2. How can you spot the mean of a normal curve? The mean and median are the same point, right in the middle.

3. If one normal curve is low and spread out and another is tall and skinny, which curve has the larger standard deviation? Since we are measuring the amount of variation in a set of values, the larger standard deviation is the low and a spread-out curve.

4. Focus on the distribution of arrival times for the Eastern Towhee for Years 1 and 33. Has the mean arrival date in Year 33 increased, decreased or remained the same as the mean in Year 1?
It has decreased since year 33's mean and late arrival has shifted, most likely from climate change.

5. The mean of the arrival times for the Blackpoll Warbler passing through Manomet in Years 1 and 33 is roughly the same. In Year 33 has

the percentage of birds that have arrived by day 56 increased, decreased or remained the same as what it was in Year 1? It has decreased and the population has shrunk.

## Video 8 Normal Calculations

1. What is another name for the Empirical rule? It is known as the 68-95-99.7 Rule. This is where around 68% fall into the middle within one standard deviation of the mean. 95% will fall into two standard deviations of the mean. 99.7% of observations will be in three standard deviations of the mean. The standard deviation is a natural yardstick for any measurements that will follow a normal distribution.

2. How tall must a woman be to join the Boston Beanstalks Club?
   5'10" for women
3. How do you calculate a z-score? A z-score is standardized value of any observation. It tells us how many standard deviations our observations fall from the mean, and in which direction. It's a way to convert data from a *normal distribution* into a *standard normal distribution*. Setting its mean at 0, and standard deviation at one, almost all the data then falls between -3 and 3.
For example, in the women's heights, x is 70". The mean, (mu), is 63.8. then the standard deviation (sigma) is 4.2. 70-63.8 divided by 4.2 is 1.48.

4. Based on z-scores, are eligibility requirements to join the Boston Beanstalks more difficult to meet for men or for women? In comparing two different normal distributions by standardizing them with a common scale. We can compare the eligibility requirements for male and female Boston Beanstalks. It's more stringent for females' requirements. The ladies have a minimum of 1.48 z-score. Men have a minimum of .98. We can see here that the height requirements are more difficult for females. They are half a standard deviation further from the mean than the males' standard deviation.