

Mean	The sum of all measures divided by the number of observations in the data set.	<table border="1" data-bbox="967 113 1435 344"> <thead> <tr> <th data-bbox="967 113 1203 149">Sample Mean</th> <th data-bbox="1203 113 1435 149">Population Mean</th> </tr> </thead> <tbody> <tr> <td data-bbox="967 149 1203 344">$\bar{X} = \frac{\sum X}{n}$</td> <td data-bbox="1203 149 1435 344">$\mu = \frac{\sum X}{N}$</td> </tr> </tbody> </table> <p data-bbox="967 348 1468 470"> where $\sum X$ is sum of all data values N is number of data items in population n is number of data items in sample </p>	Sample Mean	Population Mean	$\bar{X} = \frac{\sum X}{n}$	$\mu = \frac{\sum X}{N}$
Sample Mean	Population Mean					
$\bar{X} = \frac{\sum X}{n}$	$\mu = \frac{\sum X}{N}$					
Median	The middle value that separates the higher half from the lower half of the data set. Calculated by arranging the data in order from smallest to largest, then finding the midpoint. For data sets with an even number of observations, when there are two middle values, calculate the average between the two middle values.	<div data-bbox="967 554 1468 701" style="border: 1px solid black; padding: 10px; text-align: center;"> $\text{Median} = \frac{1}{2}(n + 1)\text{th value}$ </div>				
Mode	The most frequent value in a data set. Note: There can be more than one mode.	<div data-bbox="976 768 1451 915" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>2 3 3 5 5 5 7 7 6 6 5</p> <p style="color: brown;">mode = 5</p> </div>				
Range	The simplest form of measuring dispersion. Range is calculated as the difference between the largest and smallest values in a data set.	<div data-bbox="967 942 1468 1131" style="border: 1px solid black; padding: 10px;"> <p>12, 25, 27, 29, 36, 38, 40, 43, 50, 54, 62</p> <p style="text-align: center; color: red;">Range = 62 - 12 = 50</p> <p style="text-align: center;">Range = Max - Min</p> </div>				
Variance	The average of squared difference from the mean for a sample or population.	<p style="text-align: center;">Sample Variance</p> <div data-bbox="948 1194 1484 1541" style="border: 1px solid black; padding: 10px;"> $S^2 = \frac{\sum (X - \bar{X})^2}{n - 1}$ <p> S^2 = the variance \sum = the sum of X = the obtained score \bar{X} = the mean score of the data n = the number of scores Thus, $\sum (X - \bar{X})^2$ = the sum of squared deviations </p> </div> <p style="text-align: center;">Population Variance</p> <div data-bbox="948 1604 1484 1940" style="border: 1px solid black; padding: 10px;"> $\sigma^2 = \frac{\sum (X - \mu)^2}{N}$ <p> σ^2 = the variance \sum = the sum of X = the obtained score μ = the mean score of the data N = the number of scores Thus, $\sum (X - \bar{X})^2$ = the sum of squared deviations </p> </div>				

<p>Standard Deviation</p>	<p>Equals the square root of variance. If the standard deviation is low, data points are closely gathered around mean. If the standard deviation is high, data points are more spread out.</p>	<p style="text-align: center;">Sample Standard Deviation</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> $S = \sqrt{\frac{\sum(X - \bar{X})^2}{n - 1}}$ <p> S = the variance \sum = the sum of X = the obtained score \bar{X} = the mean score of the data n = the number of scores Thus, $\sum(X - \bar{X})^2$ = the sum of squared deviations </p> </div> <p style="text-align: center;">Population Standard Deviation</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> $\sigma = \sqrt{\frac{\sum(X - \mu)^2}{N}}$ <p> σ = the variance \sum = the sum of X = the obtained score μ = the mean score of the data N = the number of scores Thus, $\sum(X - \bar{X})^2$ = the sum of squared deviations </p> </div>
<p>DPMO</p>	<p>Average number of defects per unit observed during an average production run divided by the number of opportunities to make a defect on the product under study during that run normalized to one million.</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">DPMO = $\frac{\text{Defects} * 1,000,000}{(N * O)}$</p> <p> D = number of defects N = number of units (patients) O = number of opportunities per unit </p> </div>
<p>Cp</p>	<p>Process capability. Measures the processes capability to fit within the customer's given specification limits (USL and LSL), that does not consider where the process is centered.</p>	<p style="text-align: center;">$(USL - LSL) / 6\sigma$</p>
<p>Cpu, Cpl</p>	<p>Process capability based on the upper and lower specification limit.</p>	<p style="text-align: center;">$Cpu = \frac{USL - \bar{X}}{3\sigma}$ $Cpl = \frac{\bar{X} - LSL}{3\sigma}$</p>
<p>Cpk</p>	<p>Process capability index. Measures the processes capability to fit within the customer's given specification limits (USL and LSL), with considering where the process is centered.</p>	<p style="text-align: center;">Minimum of Cpu, Cpl</p>
<p>Control limits</p>	<p>Upper and lower control limits are based on the normal variation in the process, set at 3 +/- standard deviations from the center line (or mean)</p>	<div style="border: 1px solid black; padding: 10px;"> <p> $UCL = \mu + 3 \frac{\sigma}{\sqrt{n}}$ Upper control limit $CL = \mu$ Center line (median!) $LCL = \mu - 3 \frac{\sigma}{\sqrt{n}}$ Lower control limit μ = process mean σ = process standard deviation n = sample size </p> </div>