Cauchy Condition Encyclopedia Article

Cauchy Condition

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Cauchy Condition

The Cauchy condition, or Cauchy criterion as it is sometimes called, describes the necessary and sufficient condition that needs to exist for a sequence to converge. It was developed by **Augustin Louis Cauchy**, a French mathematician, in the early part of the 19th century and hence bears his name. The Cauchy condition provides method for testing the **convergence** of a sequence of points.

Suppose we have a function that yields the points (x_n, y_n). Also suppose that as n increases the points (x_n, y_n) approach a single point whose coordinates are (a, b). This is what is defined in mathematics as convergence. When the points (x_n, y_n) approach the point (a, b) they get closer to each other. In order for the sequence of points to converge there must be an index N such that for n N and m N and any **distance** d, the distance between (x_n, y_n) and (x_m, y_m) is always less than d. This is called the Cauchy property and is extremely important in testing convergence in mathematics. Any sequence that converges has the Cauchy property, and any sequence having the Cauchy property converges. If the Cauchy property is not met then the sequence is said to diverge. Although this test for convergence was developed in the early 19th century by Cauchy it can to this day still be found in any carefully written book on **calculus**.