Points of discontinuity

The jumping point switches to this page. For the science fiction concept, see jump drive. This article requires additional citations for verification. Please help improve this article by adding citations to trusted sources. Unwarranted material can be challenged and removed. Find sources: Classification of terminations – news · newspaper · book · undergraduate · JSTOR (March 2013) (Learn how and when to delete this template message) Continuous functionality is essential in math, functions, and applications. However, not all functions are continuous. If the function is not continuous at the point in its domain, someone says that it has a termination there. A set of all function termination points may be a discrete set, a solid set, or even an entire domain function. This article describes the classification of terminations in the case of the simplest function of one real variable that takes a real value. The oscillation of the function at the point of measuring this termination is as follows: in removable termination, the distance of the value of the disabled function is oscillation; in the termination of the jump, the size of the jump is oscillation (assuming that the value at the point lies between the boundaries of both parties); in important terminations, the oscillation measures the failure of existing limits. The limits are constant. A special case is if the function deviates to infinite or infinite minuses, in which case the oscillation is not defined (in extended real numbers, this is a removable termination). Classification For each of the following, consider the real-value f function of the real variable x, defined in the x0 point environment where f is stopped. Removable termination Function in example 1, removable termination Consider function f (x) = { x 2 for x < 1= 0= for = x=1 2= −= x= for = x=> 1 {\displaystyle f(x)={\begin{cases}x^{2}&{\mbox{ for }}x<1\\0&{\mbox{ for= }}x=1\\2-x&{\mbox{ for= }}x=>1\end{cases}}} Point x0 = 1 is a removable termination. For this kind of termination: One-sided limit of negative direction: L − = lim x → x 0 − f (x) {\displaystyle L^{-}=\lim _{x\to x_{0}^{-}}f(x)} and one side limit of positive direction: L + = lim x → x 0 + f (x) {\displaystyle L^{+}=\lim _{x\to x_{0}^{+}}f(x)} on x0 both exist, limited, and equals L = L− = L+. In other words, since two one-sided borders exist and are the same, the L limit of f(x) as approach x x0 exists and equals this same value. If the actual value of f(x0) is not equal to L, then x0 is called removable termination. This termination can be removed to make f continuous on x0, or rather, the function g (x) = { f (x) x ≠ x 0 L x = x 0 {\displaystyle g(x)={\begin{cases}f(x)&xeq x_{0}\\L&x=x_{0}\end{cases}}} continues on x = </1\\0&{\mbox{>The term removable termination is sometimes an abuse of terminology for cases where boundaries in both directions exist and are the same, while functions are undefined at point x0. [a] This use is rough because continuity and termination of functions is a concept defined only for dots in the function domain. Such a point is not in the domain properly named removable singularity. Direct termination of Function in example 2, stop jump Consider function f (x) = { x 2 for x < 1= 0= for = x=1 2= −= (= x= −= 1=)= 2= for = x=> 1 {\displaystyle f(x)={\begin{cases}x^{2}&{\mbox{ for }}x<1\\0&{\mbox{ for= }}x=1\\2-(x-1)^{2}&{\mbox{ for= }}x=>1\end{cases}}} Then, point x0 = 1 is the termination of the jump. In this case, the single limit does not exist because the one-sided limit, L− and L+, exists and is limited, but is not the same: because, L− ≠ L+, the L limit does not exist. Then, x0 is called jump stop, step stop, or first type termination. For this type of termination, function f may have any value in x0. Important termination Function in example 3, important termination For important termination, at least one of the two one-sided limits does not exist. Consider the function f (x) = { sin 5 x − 1 for x < 1= 0= for = x=1 1= x= −= 1= for = x=> 1. {\displaystyle f(x)={\begin{cases}\sin {\frac {5}{x-1}}&{\text{ for }}x<1\\0&{\text{ for= }}x=1\\{\frac {1}{x-1}}&{\text{= for= }}x=>1.\end{cases}}} Then, point x 0 = 1 {\displaystyle x_{0}=1} is an important termination. In this case, both L − {\displaystyle L^{-}} and L + {\displaystyle L^{+}} do not exist. – thus satisfying important termination conditions. So x0 is an important termination, indefinite termination, or termination of the second type. (This differs from the important singularity, which is often used when studying the functions of complex variables.) Set of function terminations A set of points at which the continuous function is always a Gδ is set. The termination set is the same set of Fσ. A series of terminations of the most important monotonic functions. This is Froda's orema. Thomae's function is stopped at every rational point, but continuously at every irrational point. In the first paragraph, there is no continuous function at any rational point, but it cannot be stopped at any irrational point. The function of rational indicators, also known as the Dirichlet function, is stopped everywhere. See also Removable singularity Mathematical singularity Extension by continuity Notes ^ See, for example, the last sentence in the definition given in Mathwords. [1] Reference ^ Sumber Malik, S.C.; Arora, Savita (1992). Mathematics Analysis (2nd ed.). New York: Wiley. </1\\0&{\text{></1\\0&{\mbox{>External link Termination. PlanetMath. Termination by Ed Pegg, Jr., The Wolfram Demonstrations Project, 2007. Weisstein, Eric W. Termination. MathWorld. Kudryavtsev, L.D. (2001) [1994], Termination Point, Encyclopedia of Mathematics, EMS Press Taken from