Asymptote Encyclopedia Article

Asymptote

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Asymptote

An asymptote is a line a function will approach. The simplest varieties are either horizontal or vertical. A vertical asymptote occurs when the function at a certain value approaches **infinity** whether one comes at it from the positive or negative side. A horizontal asymptote occurs when the function approaches a certain value as it gets closer and closer to positive or negative infinity. The behavior of the function may oscillate around the asymptote, with gradually damping oscillations as it gets closer to infinity, or it may simply monotonically increase or decrease, depending on what type of function it is.

Functions which have a denominator of order one less than their numerator may have an oblique asymptote. An oblique asymptote is neither horizontal nor vertical, but rather is the portion of the function which approximates a straight line, appearing diagonal on the usual Cartesian axis. It clearly demonstrates the dominant terms in the function, those which determine the function's behavior far from the origin.

Asymptotic behavior can be useful in graphing a function. Its asymptotic behavior near **zero** and as the function approaches infinity can be combined to look very much like an exact graph of the function. Asymptotes can also be used in determining what approximations of a function may be appropriate. If the behavior of a function at a chosen limit is known, some series approximations may be ruled out for failure to match that behavior. While the asymptotic behavior of a function is never exact, it can nevertheless provide useful insight into how that function may be dealt with.