

Determining the Arc Length of a Curve

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A natural method for deriving the arc length integral using tangent lines is presented. Because the derivative is front and center from the beginning, there is no need to use the Mean Value Theorem. The arc length problem becomes just another application that uses tangent lines to approximate values of a function. This approach is a direct consequence of the first author, a student in the second author's calculus class, responding to a question that asked students to speculate on how arc length might be approximated and then calculated. Using tangent lines to approximate arc length almost transparently extends to curves given parametrically and corresponds directly to the usual method for developing surface area integrals encountered in multivariate calculus.

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