

Vandermonde() — Vandermonde matrices

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Description

`Vandermonde(x)` returns the Vandermonde matrix containing the geometric progression of x in each row

$$\begin{bmatrix} 1 & x_1 & x_1^2 & x_1^3 & \dots & x_1^{n-1} \\ 1 & x_2 & x_2^2 & x_2^3 & \dots & x_2^{n-1} \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & x_n & x_n^2 & x_n^3 & \dots & x_n^{n-1} \end{bmatrix}$$

where $n = \text{rows}(x)$. Some authors use the transpose of the above matrix.

Syntax

numeric matrix `Vandermonde(numeric colvector x)`

Remarks and examples

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Vandermonde matrices are useful in polynomial interpolation.

Conformability

`Vandermonde(x)`:

x : $n \times 1$
result: $n \times n$

Diagnostics

None.

Alexandre-Théophile Vandermonde (1735–1796) was born in Paris. His first passion was music (particularly the violin) and he turned to mathematics only at the age of 35. Four papers dated 1771 and 1772 are his entire mathematical output, although all contain good work. He also worked in experimental science and the theory of music, arguing that musicians should ignore all theory and trust their trained ears, and was busy with various committees and other administration. Vandermonde was a strong supporter of the French Revolution. He is now best known for the Vandermonde determinant, even though it does not appear in any of his papers, and for the associated matrix. Lebesgue later conjectured that the attribution arises from a misreading of Vandermonde's notation.

Reference

Jones, P. S. 1976. Vandermonde, Alexandre-Théophile. In Vol. 13 of *Dictionary of Scientific Biography*, ed. C. C. Gillispie, 571–572. New York: Scribner's.

Also see

[M-4] [standard](#) — Functions to create standard matrices