Mathcad Selections from Numerical Recipes Function Pack

Platform: Windows
Requires Mathcad PLUS 5.0 or higher, 4 MB hard disk space
Available for immediate download (size 2293261 bytes) or ground shipment

This on-line Function Pack contains over 140 useful functions from the second edition of Numerical Recipes, the best-selling book by William H. Press, William T. Vetterling, Saul A. Teukolsky, and Brian P. Flannery. Once installed, these functions become part of the Mathcad PLUS function set, further enhancing the power of Mathcad. A Mathcad Electronic Book is included to document the functions and provide background information and working examples. You'll benefit from easier, quicker access to ideas and numerical algorithms -- all without the need for programming or compiling code.

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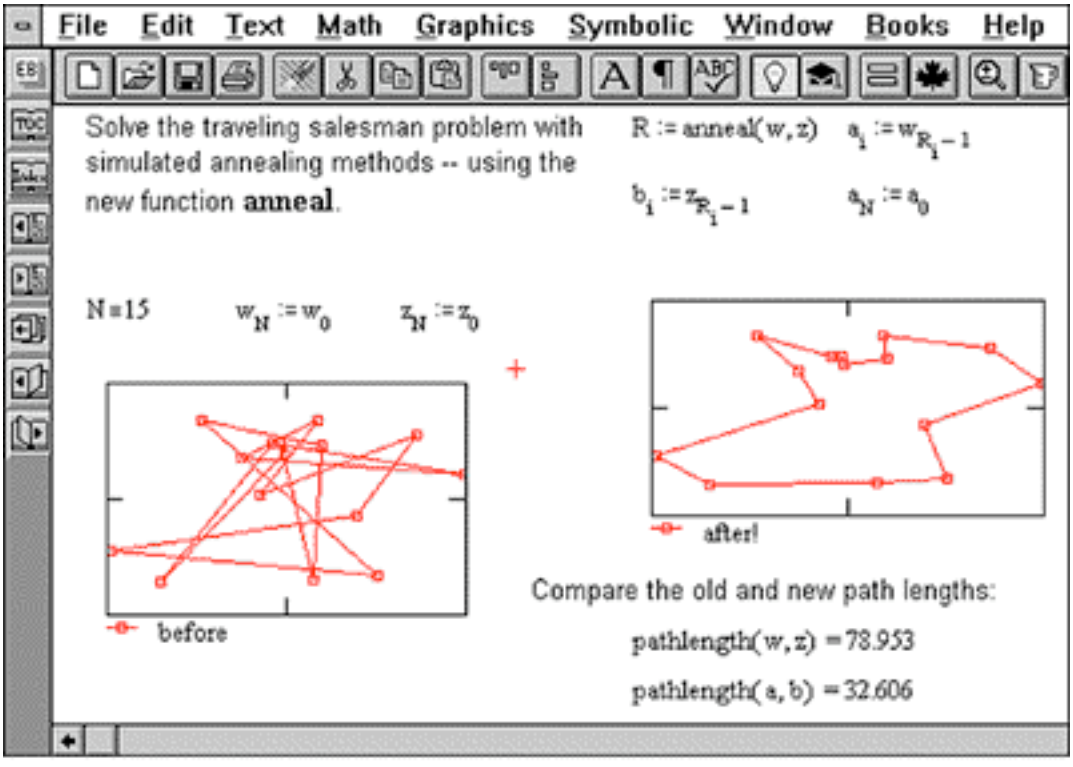

Use the added functionality in this function pack to simulate annealing methods. The anneal function is used in solving the traveling salesman problem.

Topics include: Two-dimensional Polynomial and Spline Interpolation, Laguerre's Method of Finding Roots, Power Spectra, Wavelet Transforms, Chebyshev and Rational Function Approximations, Monte Carlo Integration, and much more. Applications include: Circuit Analysis, Predator-Prey Interaction, and Prediction of Stock Market Averages.

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Power Spectrum Estimation

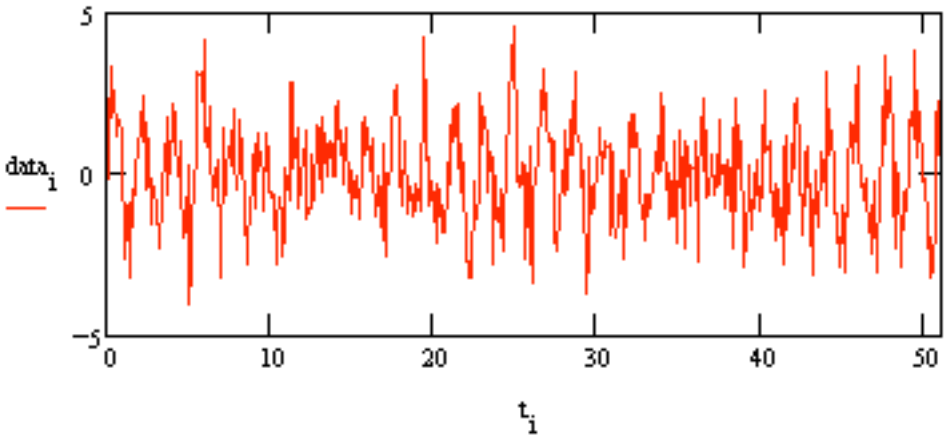
We give an example where we compute the power spectrum estimation of a signal consisting of two sine waves with different frequencies, plus some white noise, which we create using **gasdev** (another function in the Function Pack).

$N := 2^9 - 1$ $\quad i := 0..N$

$\Delta := .1$ $\quad t_i := \Delta \cdot i$

$f2 := .53$ $\quad f1 := .57$

$data_i := \sin(2 \cdot \pi \cdot t_i \cdot f1) + \sin(2 \cdot \pi \cdot t_i \cdot f2)$ $\quad data := data + gasdev(N + 1)$



We compute the power spectrum with 20, 85 and 250 coefficients.

$M := 1024$ $\quad j := 0..M$ $\quad x_j := \frac{j}{M \cdot 2}$

$E20 := evlmem(x, data, 20)$ $\quad E85 := evlmem(x, data, 85)$ $\quad E250 := evlmem(x, data, 250)$

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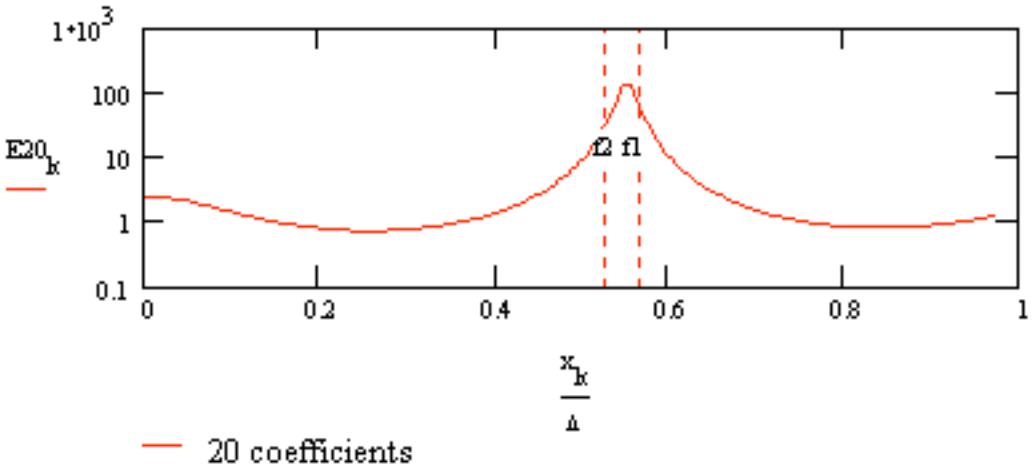
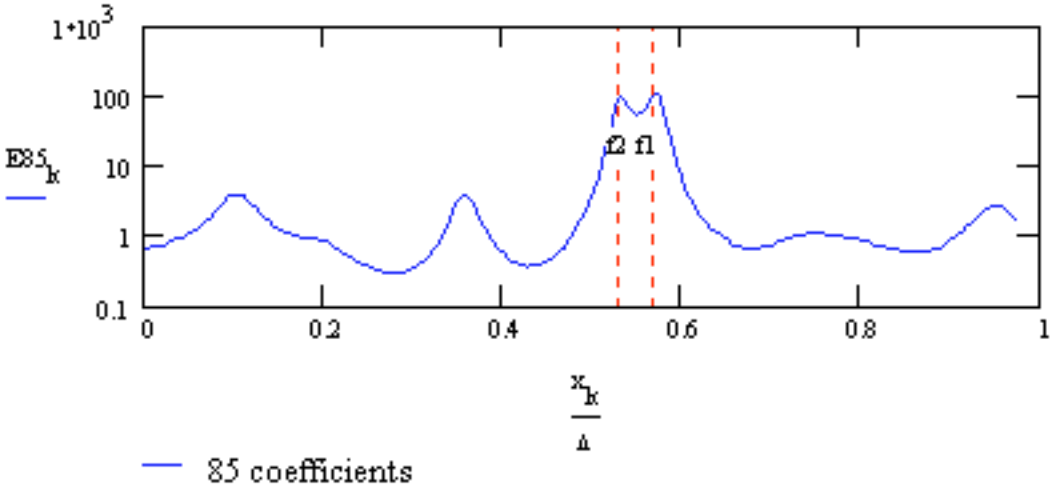
To see the interesting range of frequencies clearly, we graph only the range of frequencies containing **f1** and **f2**.





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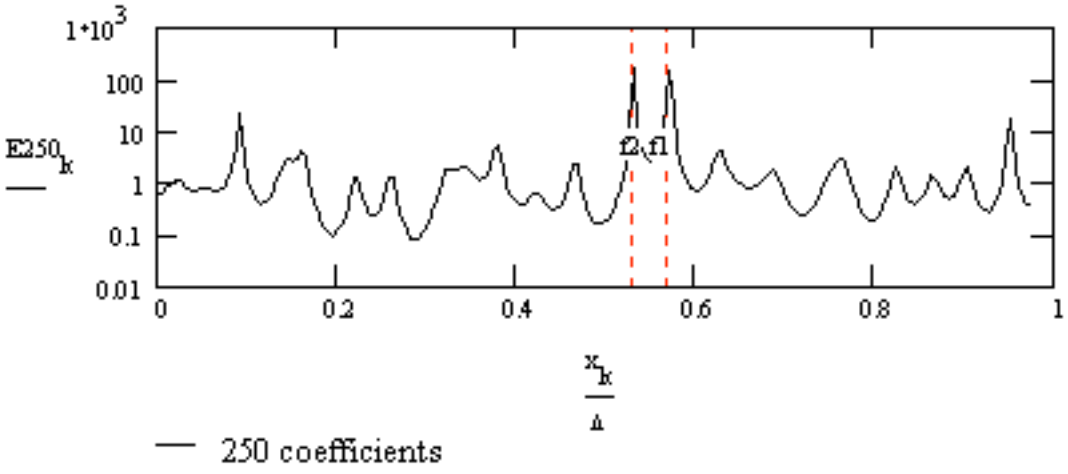

We can see that with only 20 coefficients we cannot distinguish between the two peaks corresponding to the different frequencies. With 85 coefficients the peaks start to separate, and with 250 coefficients they are quite distinct, although the background noise is starting to show false peaks, visible with the logarithmic scale.

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