Adaptive Plot

CSspline

CSpline

$MaxIters := 100$

$X := [1..25]$

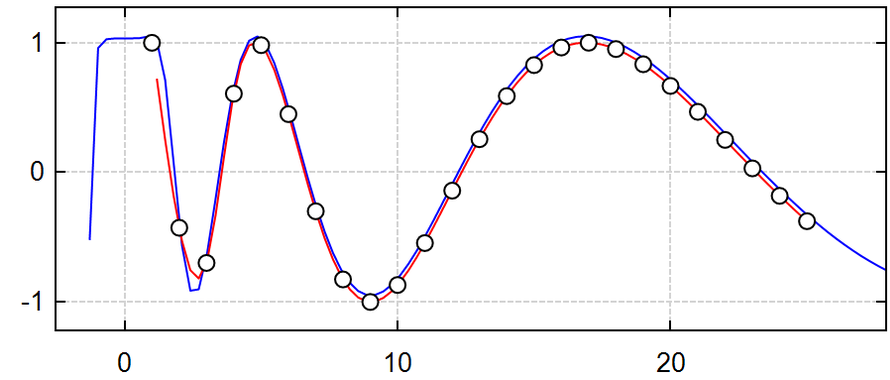
$f(x) := \sin\left(\ln\left(x^5 + 4\right)\right)$

$M := CS_V\left(X, \overrightarrow{f(X)}\right)$

$p(x) := CS(M, x)$

$\Pi := \begin{cases} f(x) + 0.05 \\ p(x) \\ \text{augment}\left(M_1, M_2, "."\right) \end{cases}$

CS Interpolation



$[a := 1 \quad b := 25]$

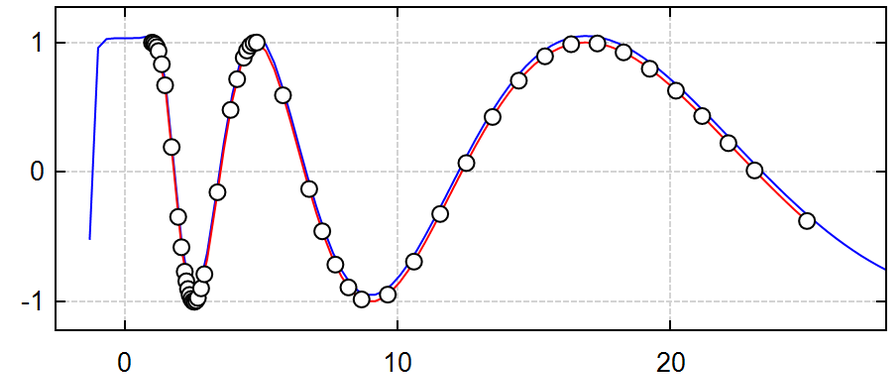
$f(x) := \sin\left(\ln\left(x^5 + 4\right)\right)$

$M := CS_A(f, a, b)$

$p(x) := CS(M, x)$

$\Pi := \begin{cases} f(x) + 0.05 \\ p(x) \\ \text{augment}\left(M_1, M_2, "."\right) \end{cases}$

Adaptive CS interpolation



Adaptive Plot Test

Adaptive Plot

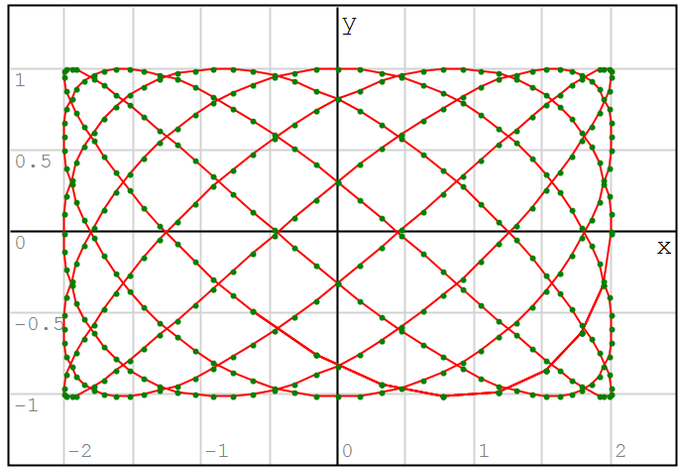
Cartesians: $f(x) \equiv x + i \cdot f(x)$

Polars: $\rho(\theta) \equiv \rho(\theta) \cdot e^{i \cdot \theta}$

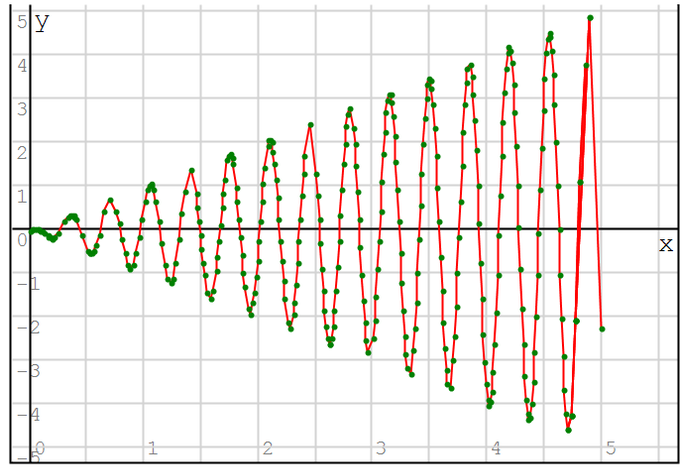
Parametrics: $z(t) \equiv x(t) + i \cdot y(t)$

$z(t) := 2 \cdot \cos(5 \cdot t) + i \cdot \sin(7 \cdot t)$

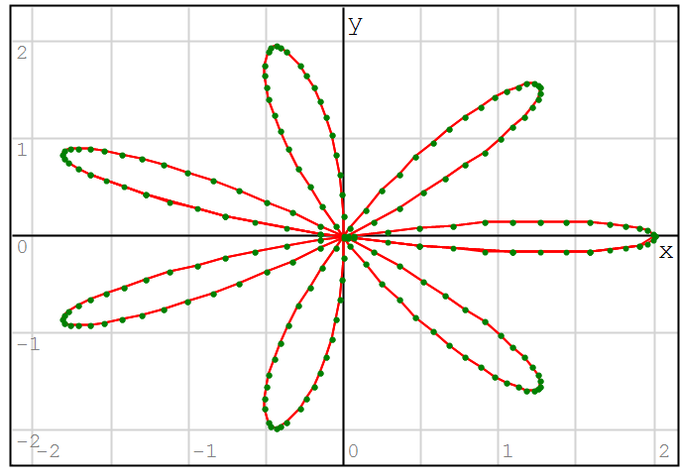
$Z := APlot(z, 0, 2 \cdot \pi)$



$$f(x) := x + i \cdot x \cdot \cos(18 \cdot x)$$
$$Z := APlot(f, 0, 5)$$



$$\rho(\theta) := 2 \cdot \cos(7 \cdot \theta) \cdot e^{i \cdot \theta}$$
$$Z := APlot(\rho, 0, 2 \cdot \pi)$$



CSpline Diff & Int

CS Interpolation: Diff & Int

$$\begin{cases} X := [1, 1.5 .. 12] \\ f(x) := \sin(1 - \ln(x)) \end{cases}$$

$$\begin{cases} M := CS_V\left(X, \overrightarrow{f(X)}\right) \\ p(x) := CS(M, x) \end{cases}$$

$$[a\ b] := [3.1\ 9.1]$$

$$[a\ b] := [\min(X)\ \max(X)]$$

$f(a) = -0.131$ $\quad p(a) = -0.131$

$f(b) = -0.935$ $\quad p(b) = -0.935$

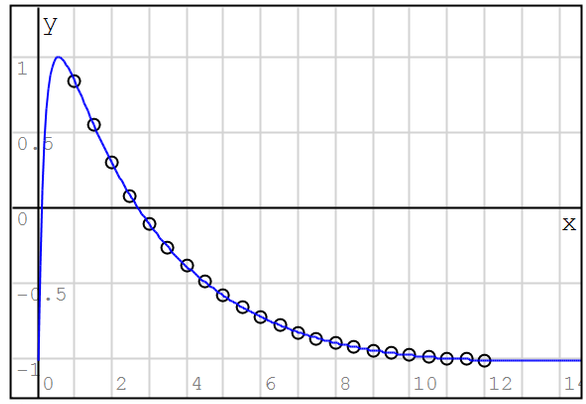
$\frac{d}{d\,a} f(a) = -0.3198$ $\quad CS_D(M, a) = -0.3199$

$\frac{d}{d\,b} f(b) = -0.039$ $\quad CS_D(M, b) = -0.039$

$\frac{d}{d\,a}\frac{d}{d\,a} f(a) = 0.1168$ $\quad CS_{D2}(M, a) = 0.1175$

$\frac{d}{d\,b}\frac{d}{d\,b} f(b) = 0.0156$ $\quad CS_{D2}(M, b) = 0.0156$

$\int_a^b f(x)\,dx = -3.9742$ $\quad CS_I(M, a, b) = -3.9773$



$$\begin{cases} f(x) \\ \text{augment}(M_1, M_2, \text{"o"}) \end{cases}$$

Alvaro