**Hermite Spline Approximation**

Hermite Spline Approximation splits function into intervals and for each interval builds a 3rd degree polynomial that conforms to

Or for interval :

Coefficients for the polynomial on can be found with formulas

(Here ):

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Or when substituting and simplifying:

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**Approximation Error**

On some interval error bound can be found with the formula taken from the literature:

where

* – point where error is evaluated
* – value in interval

is maximized when is in the middle between and . In other words when .

is monotonically decreasing when . Therefor its max value on interval is always at , or:

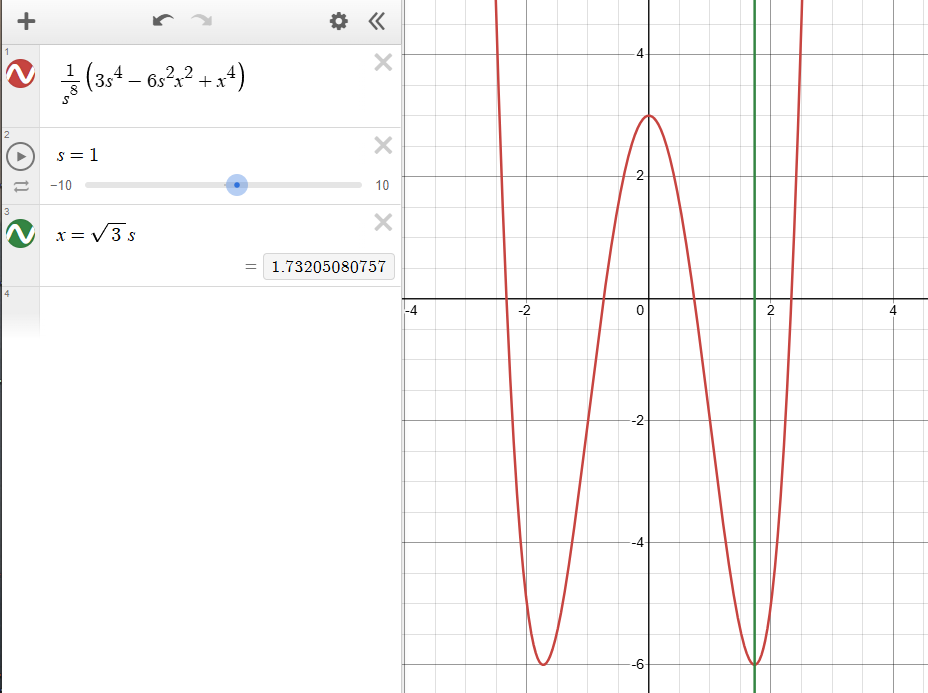
Therefore, max error on the interval can be found:

Note that when the point of min value of is .

And if interval is left of () then function is monotonically falling, and max is at .

If interval is right of () then function is monotonically raising, and max is at .

If interval includes , then max must be chosen between and .



**Argument x cutoff**

The function drops fast and returns 32 bit values. After certain function values become so small that they will be always rounded to 0.

We find such that :

If x is sampled in such a way that there is 16 bit of samples for every sigma we round up

For 16 bit samples x cutoff is 50050. This is last x that will return non-zero value.

For sampling rate is 32 bit of samples per sigma:

For 32 bit samples x cutoff is . This is last x that will return non-zero value.