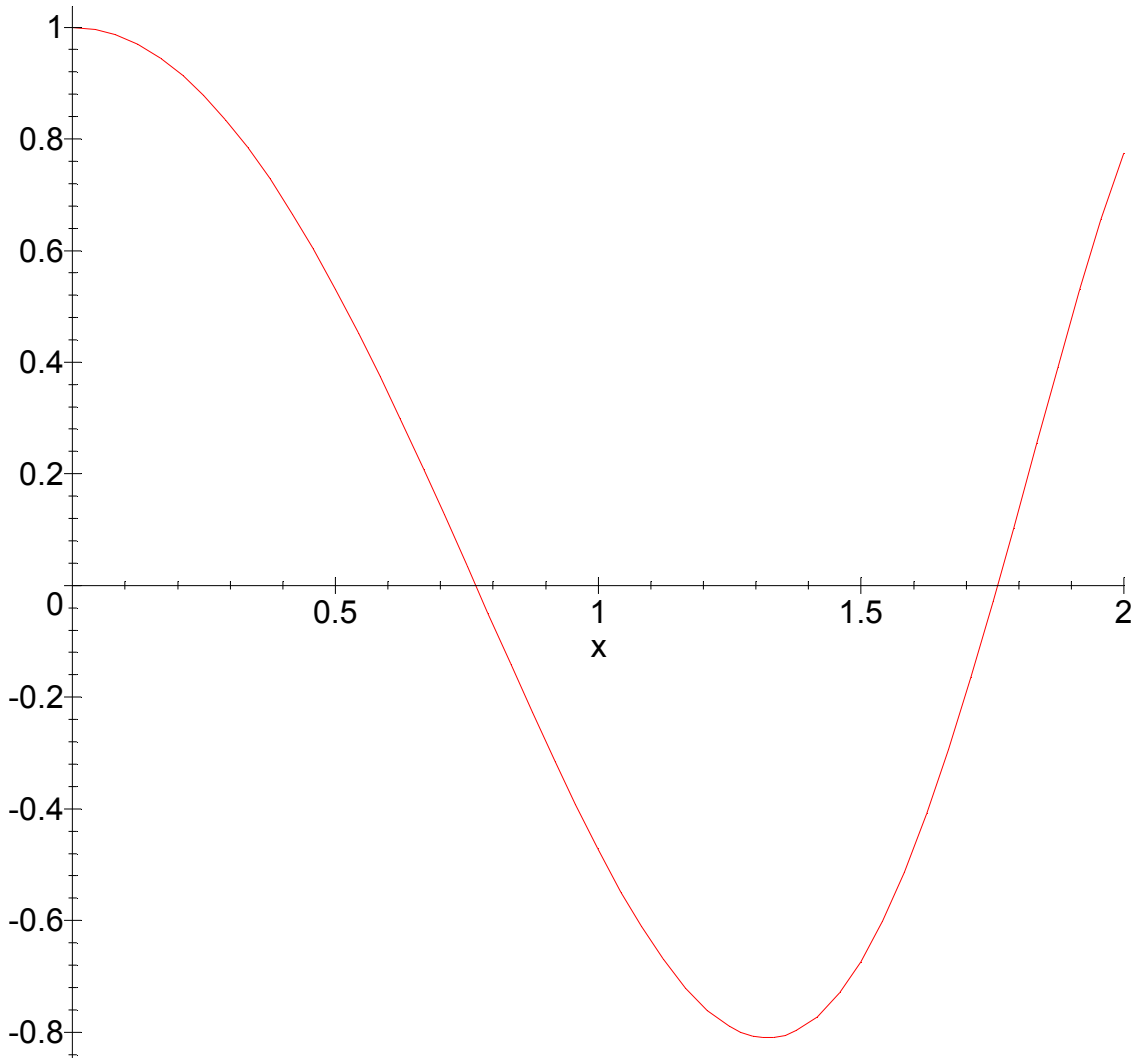
```
> restart:
  f := (x -> -sin(x^2)+exp(-x^2));
  plot(f(x),x=0..2);
```

$$f := x \to -\sin(x^2) + e^{(-x^2)}$$




```
> x0:=0.3  :  x1:=.5  :  x2:=.9  :  x3:=1.5
  :  x4:=2.  :
```

```
> f0:=f(x0);f1:=f(x1);f2:=f(x2);f3:=f(x3);f4:
  =f(x4);
```

$$f0 := .8240526361$$

$$f1 := .5313968238$$

$$f2 := -.2794291082$$

$$f3 := -.6726739723$$

$$f4 := .7751181342$$

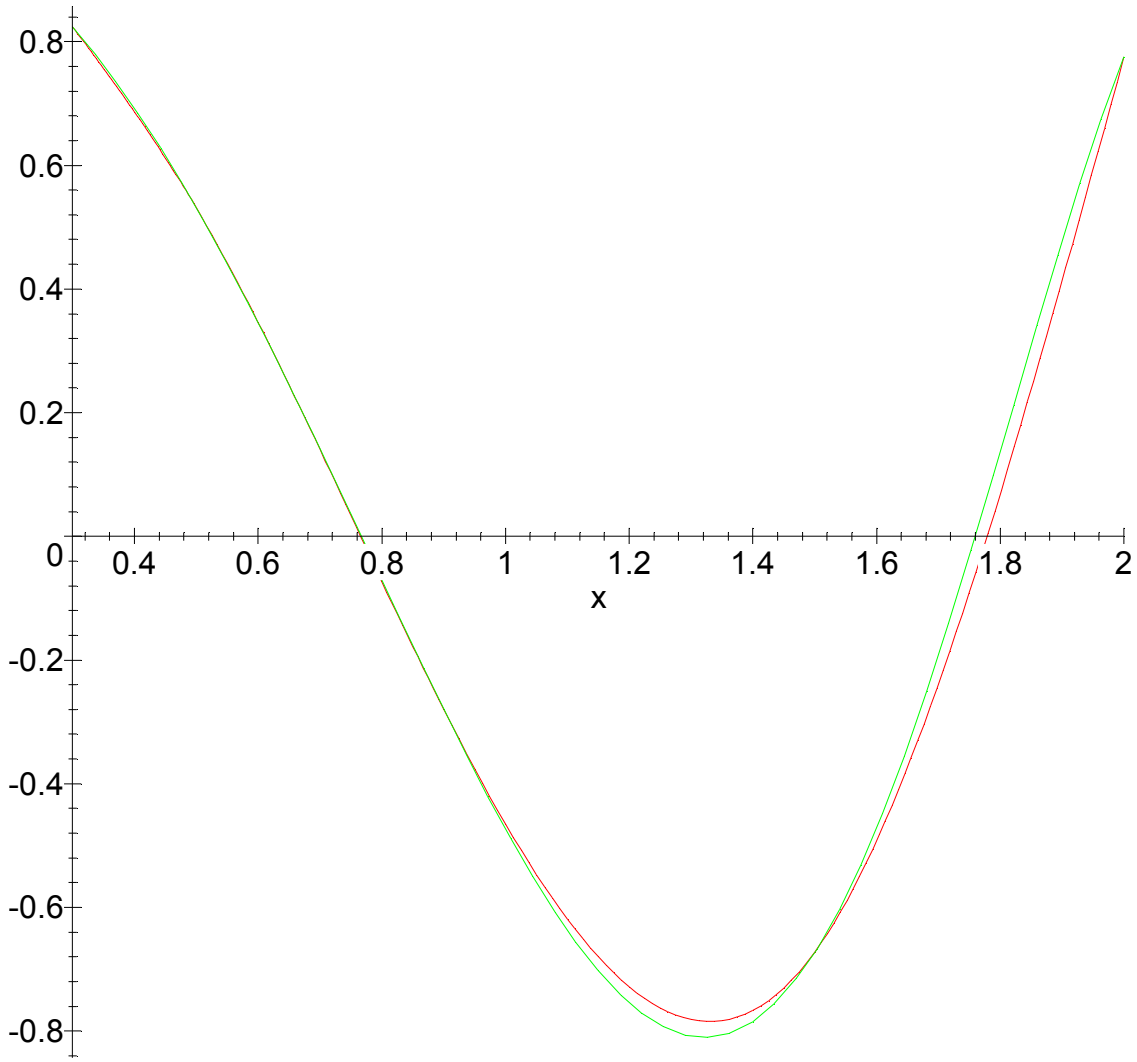
```
> readlib(spline):

> spline([x0,x1,x2,x3,x4],[f0,f1,f2,f3,f4],x,
  cubic);
```

$$\begin{cases} 1.306950628 - 2.136631240\,x + 2.634856349\,x^2 \\ \quad - 2.927618165\,x^3 , & x < .5 \\ .6495514449 + 1.807763853\,x - 5.253933838\,x^2 \\ \quad + 2.331575292\,x^3 , & x < .9 \\ .924906466 + .889913777\,x - 4.234100419\,x^2 \\ \quad + 1.953859211\,x^3 , & x < 1.5 \\ 17.77527986 - 32.81083303\,x + 18.23306413\,x^2 \\ \quad - 3.038844022\,x^3 , & otherwise \end{cases}$$

```
> p1:=plot(1.306950628-2.136631243*x+2.634856
  362*x^2-2.927618180*x^3,x=0.3..0.5):
> p2:=plot(.6495514421+1.807763874*x-5.253933
  872*x^2+2.331575309*x^3,x=0.5..0.9):
> p3:=plot(.924906481+.88991374*x-4.234100388
  *x^2+1.953859203*x^3,x=0.9..1.5):
```

```
> p4:=plot(17.77527984-32.81083299*x+18.23306
  411*x^2-3.038844019*x^3,x=1.5..2):
> p5:=plot(
  -sin(x^2)+exp(-x^2),x=0.3...2,color=green):
> with(plots):
> display({p1,p2,p3,p4,p5});
```




```
> h0:=x1-x0:h1:=x2-x1:h2:=x3-x2:h3:=x4-x3:
```

```
> b1:=6*((f2-f1)/h1-(f1-f0)/h0);
```

$$b1 := -3.382714608$$

```
> b2:=6*((f3-f2)/h2-(f2-f1)/h1);
```

$$b2 := 8.229940339$$

```
> b3:=6*((f4-f3)/h3-(f3-f2)/h2);
```

$$b3 := 21.30595392$$

```
> with(linalg):
Warning, new definition for norm
Warning, new definition for trace
> A := matrix(
  [[2*(h0+h1),h1,0],[h1,2*(h1+h2),h2],[0,h2,2
  *(h2+h3)]] );
  b := vector( [b1,b2,b3]);
  linsolve(A, b);
```

$$A := \begin{bmatrix} 1.2 & .4 & 0 \\ .4 & 2.0 & .6 \\ 0 & .6 & 2.2 \end{bmatrix}$$

$$b := [-3.382714608, 8.229940339, 21.30595392]$$

$$[-3.513141809, 2.082638906, 9.116532082]$$

```
> s:=vector([s1,s2,s3]):s:=linsolve(A, b);
```

$$s := [-3.513141809, 2.082638908, 9.116532079]$$

```
>
```

```
> s0:=0.:
  s1:=s[1]:
  s2:=s[2]:
  s3:=s[3]:
  s4:=0.:
```

```
>
>
> a0:=(s1-s0)/6/h0;b0:=s0/2.;c0:=(f1-f0)/h0-(
  2*h0*s0+h0*s1)/6;d0:=f0;
```

$$a0 := -2.927618176$$

$$b0 := 0$$

$$c0 := -1.346174335$$

$$d0 := .8240526361$$

```
> q1:=plot(a0*(x-x0)^3+b0*(x-x0)^2+c0*(x-x0)+
  d0,x=x0..x1,color=black):
> a1:=(s2-s1)/6/h1;b1:=s1/2.;c1:=(f2-f1)/h1-(
  2*h1*s1+h1*s2)/6;d1:=f1;
```

$$a1 := 2.331575299$$

$$b1 := -1.756570905$$

$$c1 := -1.697488516$$

$$d1 := .5313968238$$

```
> q2:=plot(a1*(x-x1)^3+b1*(x-x1)^2+c1*(x-x1)+
  d1,x=x1..x2,color=blue):
> a2:=(s3-s2)/6/h2;b2:=s2/2.;c2:=(f3-f2)/h2-(
  2*h2*s2+h2*s3)/6;d2:=f2;
```

$$a2 := 1.953859215$$

$$b2 := 1.041319454$$

$$c2 := -1.983589096$$

$$d2 := -.2794291082$$

```
> q3:=plot(a2*(x-x2)^3+b2*(x-x2)^2+c2*(x-x2)+
  d2,x=x2..x3,color=black):
```

```
> a3:=(s4-s3)/6/h3;b3:=s3/2.;c3:=(f4-f3)/h3-(
  2*h3*s3+h3*s4)/6;d3:=f3;
```

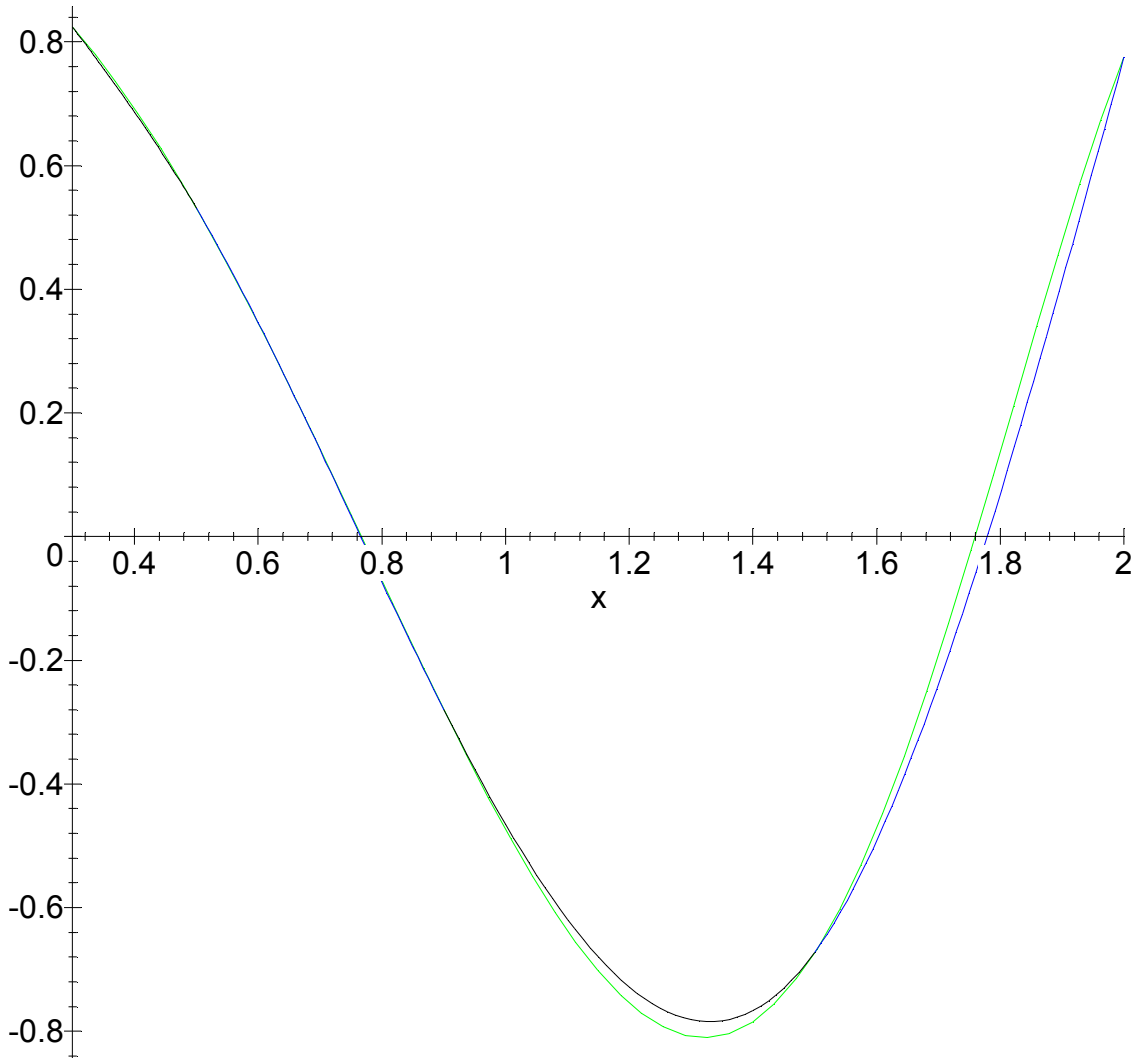
$$a3 := -3.038844027$$

$$b3 := 4.558266040$$

$$c3 := 1.376162201$$

$$d3 := -.6726739723$$

```
> q4:=plot(a3*(x-x3)^3+b3*(x-x3)^2+c3*(x-x3)+
  d3,x=x3..x4,color=blue):
>
> display({q1,q2,q3,q4,p5});
```



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