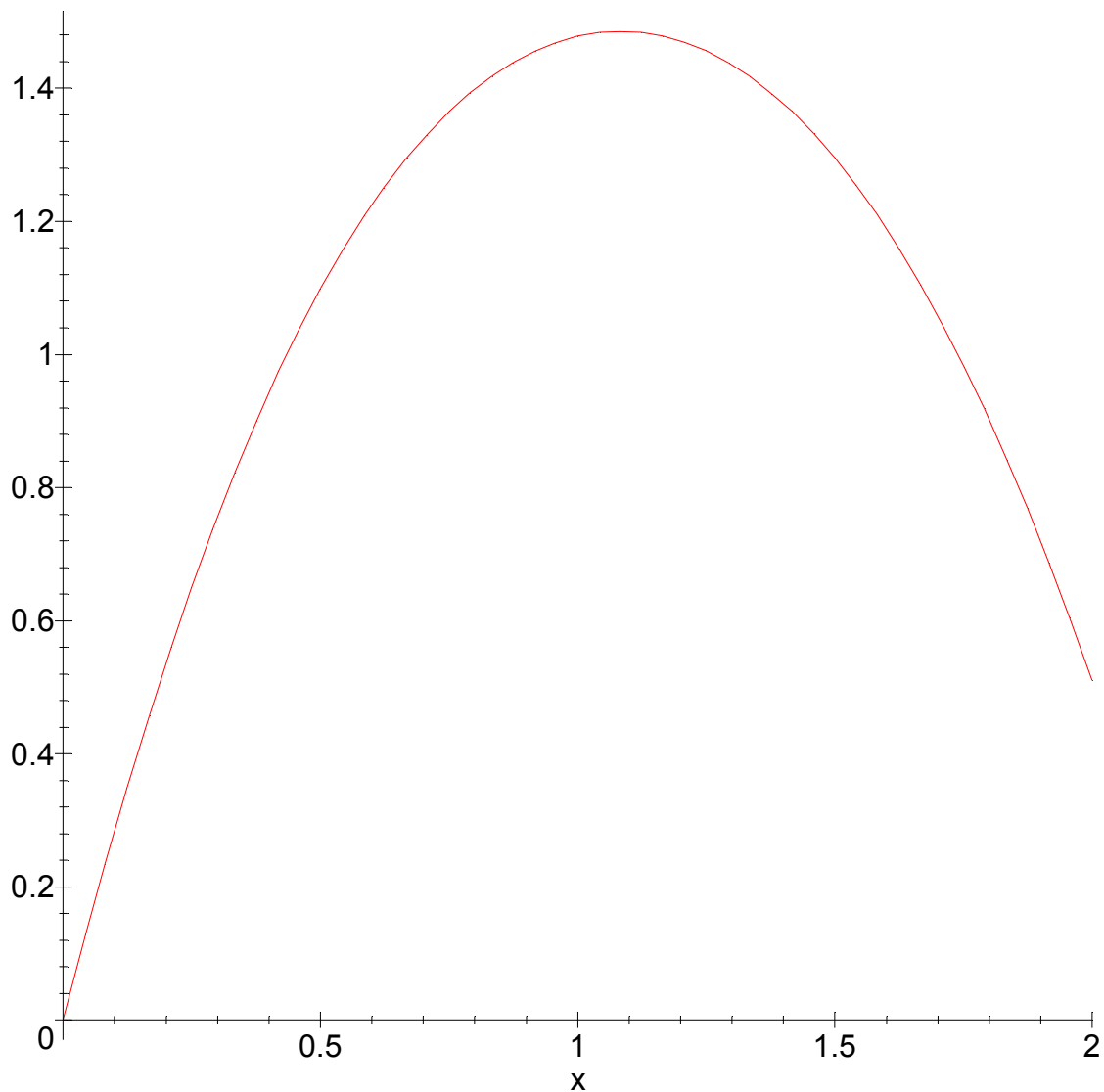


```
> restart:
f := (x ->
3*sin(x)+exp(-x^2)-sqrt(x^2+1.)) ;
plot(f(x), x=0..2) ;
```

$$f := x \rightarrow 3 \sin(x) + e^{(-x^2)} - \sqrt{x^2 + 1}.$$



```
> a0:=evalf(subs(x=0.,diff(f(x),x)));
```

```

                                 $a0 := 3.$ 
>  $b0 := \text{evalf}(\text{subs}(x=2., \text{diff}(f(x), x)))$ ;
                                 $b0 := -2.216130257$ 
>  $x0 := 0.$  :  $x1 := .4$  :  $x2 := .9$  :  $x3 := 1.3$  :
 $x4 := 2.$  :
>  $f0 := f(x0)$  ;  $f1 := f(x1)$  ;  $f2 := f(x2)$  ;  $f3 := f(x3)$  ;  $f4 := f(x4)$  ;

                                 $f0 := 0$ 
                                 $f1 := .943365855$ 
                                 $f2 := 1.449476390$ 
                                 $f3 := 1.435072133$ 
                                 $f4 := .510139941$ 
>  $\text{readlib}(\text{spline})$  :
 $\text{with}(\text{plots})$  :

>  $h0 := x1 - x0$  ;  $h1 := x2 - x1$  ;  $h2 := x3 - x2$  ;  $h3 := x4 - x3$  :
>  $b1 := 6 * ((f1 - f0) / h0 - a0)$  ;
                                 $b1 := -3.84951217$ 
>  $b2 := 6 * ((f2 - f1) / h1 - (f1 - f0) / h0)$  ;
                                 $b2 := -8.077161410$ 
>  $b3 := 6 * ((f3 - f2) / h2 - (f2 - f1) / h1)$  ;
                                 $b3 := -6.289390275$ 
>  $b4 := 6 * ((f4 - f3) / h3 - (f3 - f2) / h2)$  ;
                                 $b4 := -7.711926363$ 
>  $b5 := 6 * (b0 - (f4 - f3) / h3)$  ;
                                 $b5 := -5.368791322$ 

```

```
> with(linalg):
```

```
Warning, new definition for norm
```

```
Warning, new definition for trace
```

```
> A := matrix(
```

```
  [[2*h0,h0,0,0,0],[h0,2*(h0+h1),h1,0,0],[0,h  
1,2*(h1+h2),h2,0],[0,0,h2,2*(h2+h3),h3],[0,  
0,0,h3,2*h3]] );
```

```
b := vector( [b1,b2,b3,b4,b5] );
```

```
linsolve(A, b);
```

$$A := \begin{bmatrix} .8 & .4 & 0 & 0 & 0 \\ .4 & 1.8 & .5 & 0 & 0 \\ 0 & .5 & 1.8 & .4 & 0 \\ 0 & 0 & .4 & 2.2 & .7 \\ 0 & 0 & 0 & .7 & 1.4 \end{bmatrix}$$

```
b := [-3.84951217, -8.077161410, -6.289390275, -7.711926363,  
-5.368791322]
```

```
[-3.218339391, -3.187101642, -2.106085396, -2.262214348,  
-2.703743770]
```

```
> s:=vector([s0,s1,s2,s3,s4]):s:=linsolve(A,  
b);
```

```
s := [-3.218339392, -3.187101642, -2.106085396,  
-2.262214348, -2.703743770]
```

```
>
```

```
> s0:=s[1]:
```

```
s1:=s[2]:
```

```
s2:=s[3]:
```

```
s3:=s[4]:
```

```
s4:=s[5]:
```

```
>
```

```
>
```

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

```
a0:=.01301572917
```

```
b0:=-1.609169696
```

```
c0:=3.000000000
```

```
d0:=0
```

```
> p1:=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:=.3603387487
```

```
b1:=-1.593550821
```

```
c1:=1.718911793
```

```
d1:=.943365855
```

```
> p2:=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:=-.06505373001
```

```
b2:=-1.053042698
```

```
c2:=.3956150335
```

```
d2:=1.449476390
```

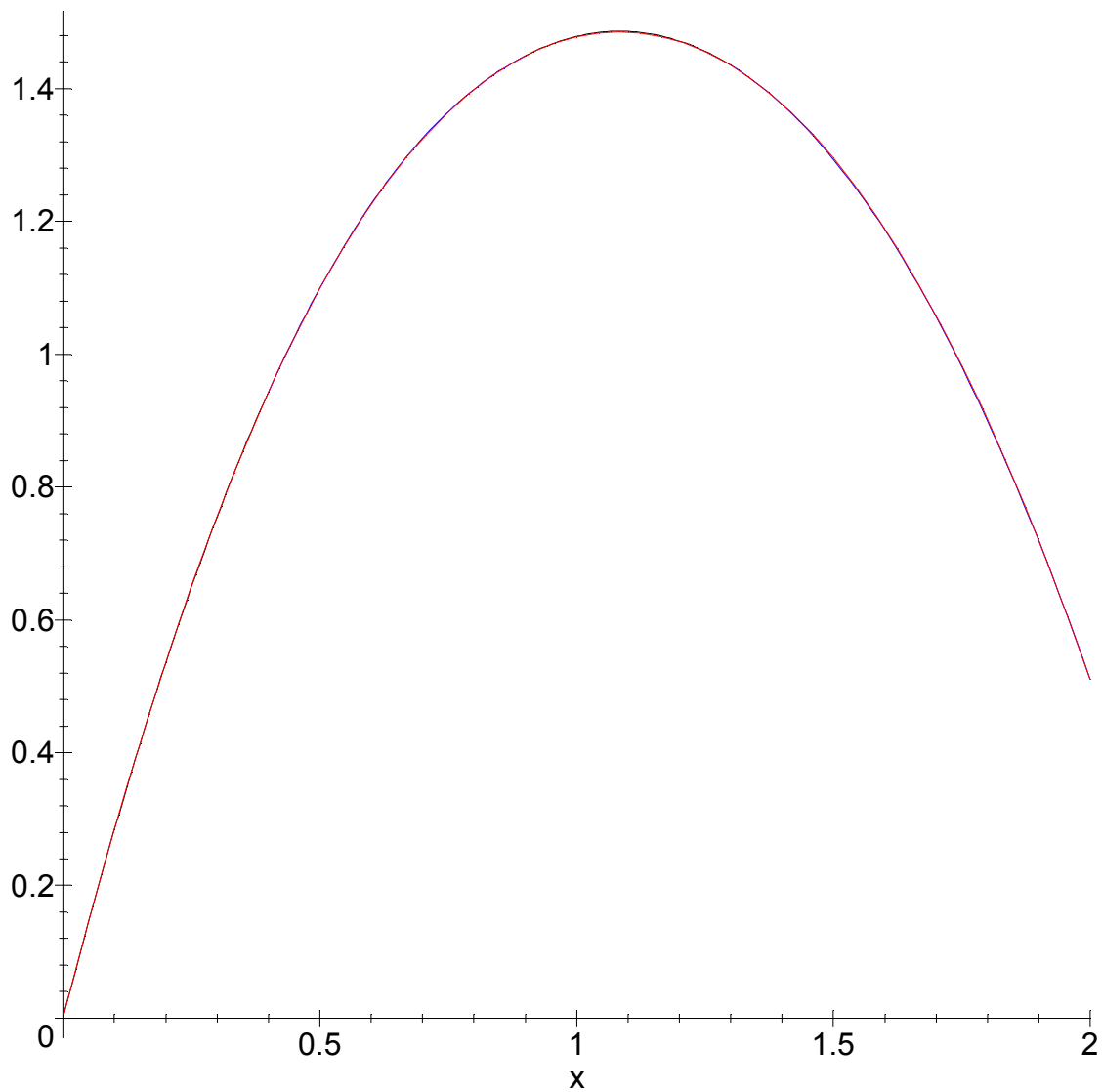
```
> p3:=plot(a2*(x-x2)^3+b2*(x-x2)^2+c2*(x-x2)+
```

```

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:=-.1051260529
      b3:=-1.131107174
      c3:=-.4780449152
      d3:=1.435072133
> p4:=plot(a3*(x-x3)^3+b3*(x-x3)^2+c3*(x-x3)+
d3,x=x3..x4,color=blue):
> p5:=plot(3*sin(x)+exp(-x^2)-sqrt(x^2+1.),x=
x0..x4,color=red):
> display({p1,p2,p3,p4,p5});

```



>

```
> #           A (I)           B (I)           C (I)
D (I)
      .82405263   -1.14593035   -1.70623098
      .59743716
      .53139682   -1.75673028   -1.34776869
      1.67983082
```

- .27942910	-2 .02862644	.66802829
2 .70111488		
- .67267397	1 .69021158	5 .53003508
-6 .23857965		