```
> restart;
```

Problem 5.1

```
> f:= (t,x) -> max((x-t),0);
```

$$f := (t, x) \rightarrow \max(x - t, 0) \quad (1)$$

```
> f0:= unapply(f(0,x),x);
  f1:= unapply(f(0.5,x),x);
  f2:= unapply(f(1.0,x),x);
```

$$f0 := x \rightarrow \max(0, x)$$
$$f1 := x \rightarrow \max(0, x - 0.5)$$
$$f2 := x \rightarrow \max(0, x - 1.0) \quad (2)$$

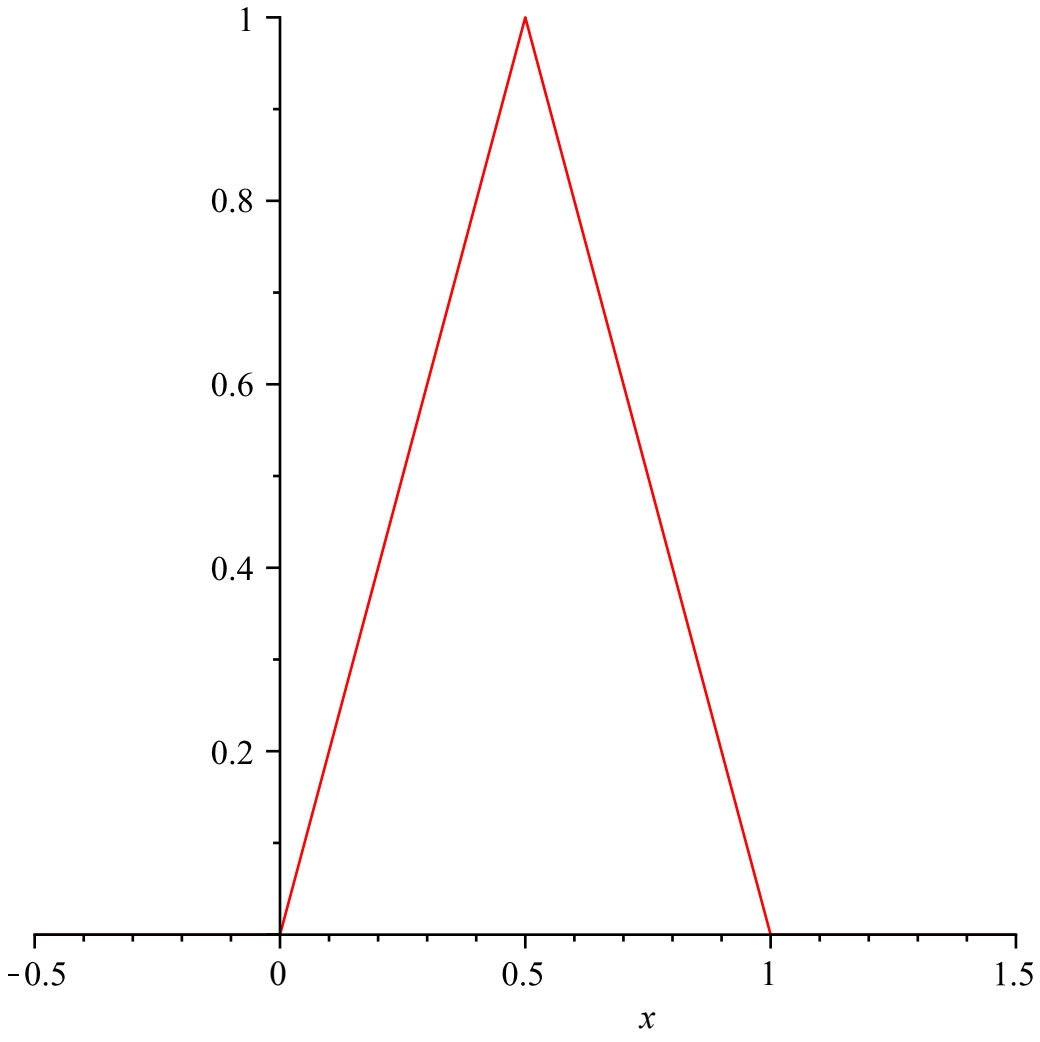
```
> f01:= unapply((f1(x)-f0(x))/0.5,x);
  f12:= unapply((f2(x)-f1(x))/0.5,x);
```

$$f01 := x \rightarrow 2.000000000 \max(0, x - 0.5) - 2.000000000 \max(0, x)$$
$$f12 := x \rightarrow 2.000000000 \max(0, x - 1.0) - 2.000000000 \max(0, x - 0.5) \quad (3)$$

```
> f012:= unapply(f12(x)-f01(x),x);
```

$$f012 := x \rightarrow 2.000000000 \max(0, x - 1.0) - 4.000000000 \max(0, x - 0.5) + 2.000000000 \max(0, x) \quad (4)$$

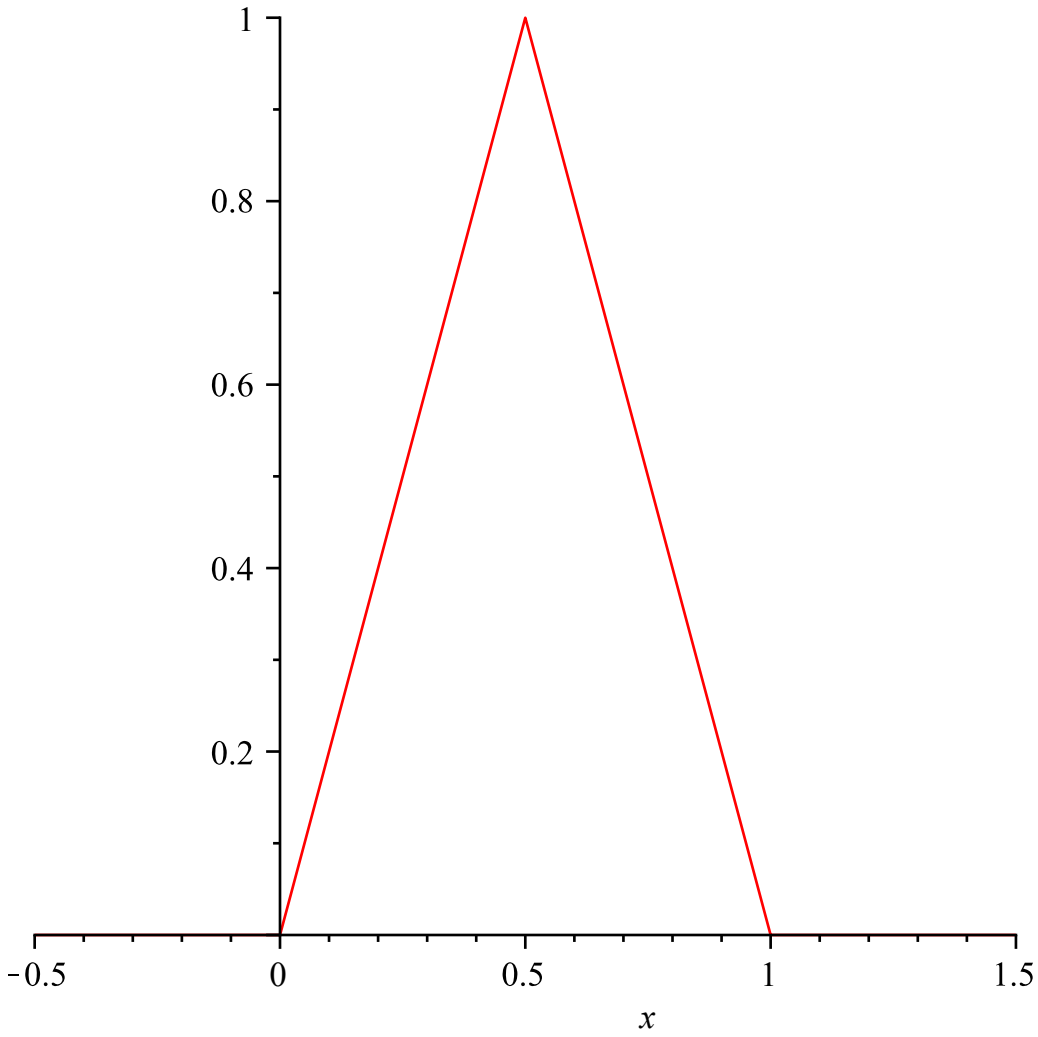
```
> plot(f012(x),x=-0.5..1.5);
```



```
> with(CurveFitting);
  kn:= [0,0.5,1];
  plot(BSpline(2,x,knots=kn),x=-0.5..1.5);
```

[*ArrayInterpolation*, *BSpline*, *BSplineCurve*, *Interactive*, *LeastSquares*, *PolynomialInterpolation*, *RationalInterpolation*, *Spline*, *ThieleInterpolation*]

$$kn := [0, 0.5, 1]$$



```
> restart:
```

Problem 5.2

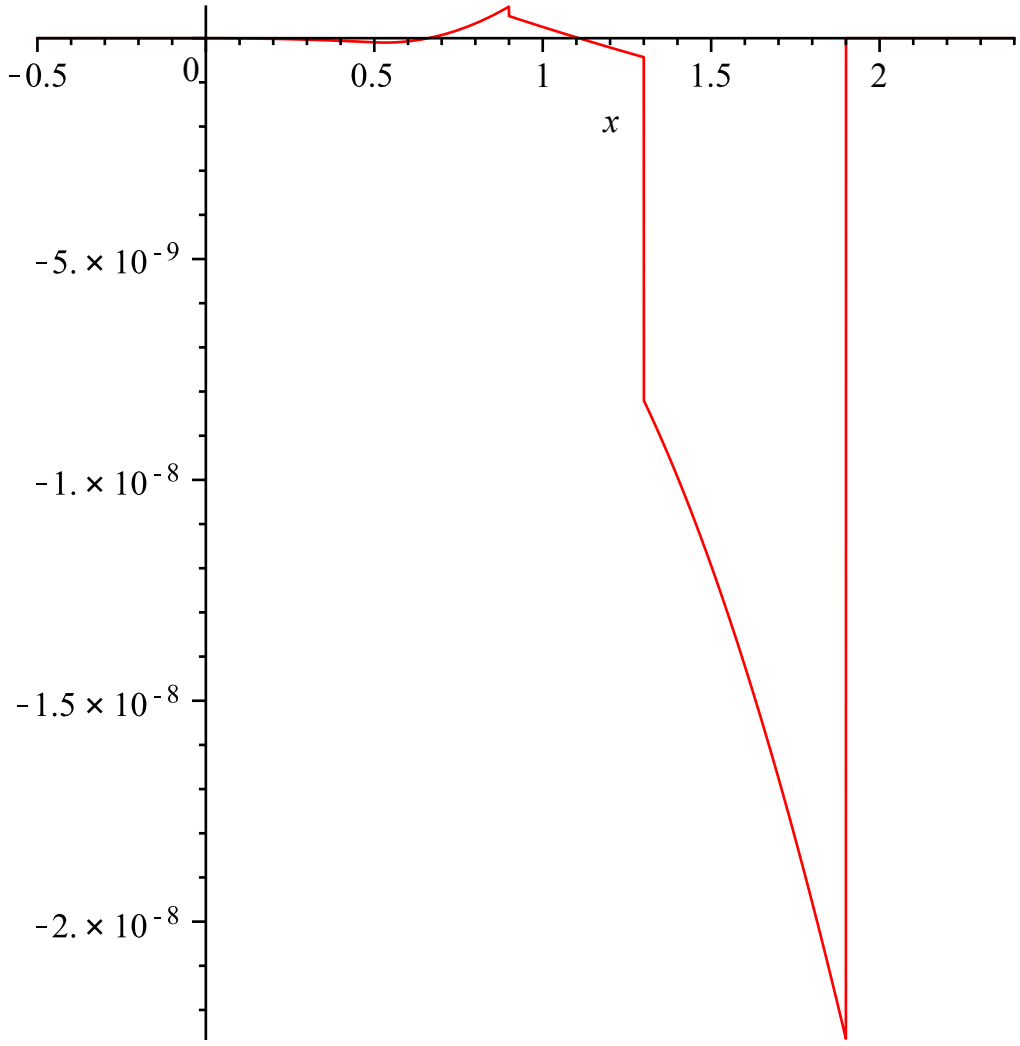
```
> with(CurveFitting):
  kn:= [0,0.5,0.9,1.3,1.9];
  kn1:=[0,0.5,0.9,1.3];
  kn2:= [0.5,0.9,1.3,1.9];
```

$$kn := [0, 0.5, 0.9, 1.3, 1.9]$$

$$kn1 := [0, 0.5, 0.9, 1.3]$$

$$kn2 := [0.5, 0.9, 1.3, 1.9] \quad \textbf{(5)}$$

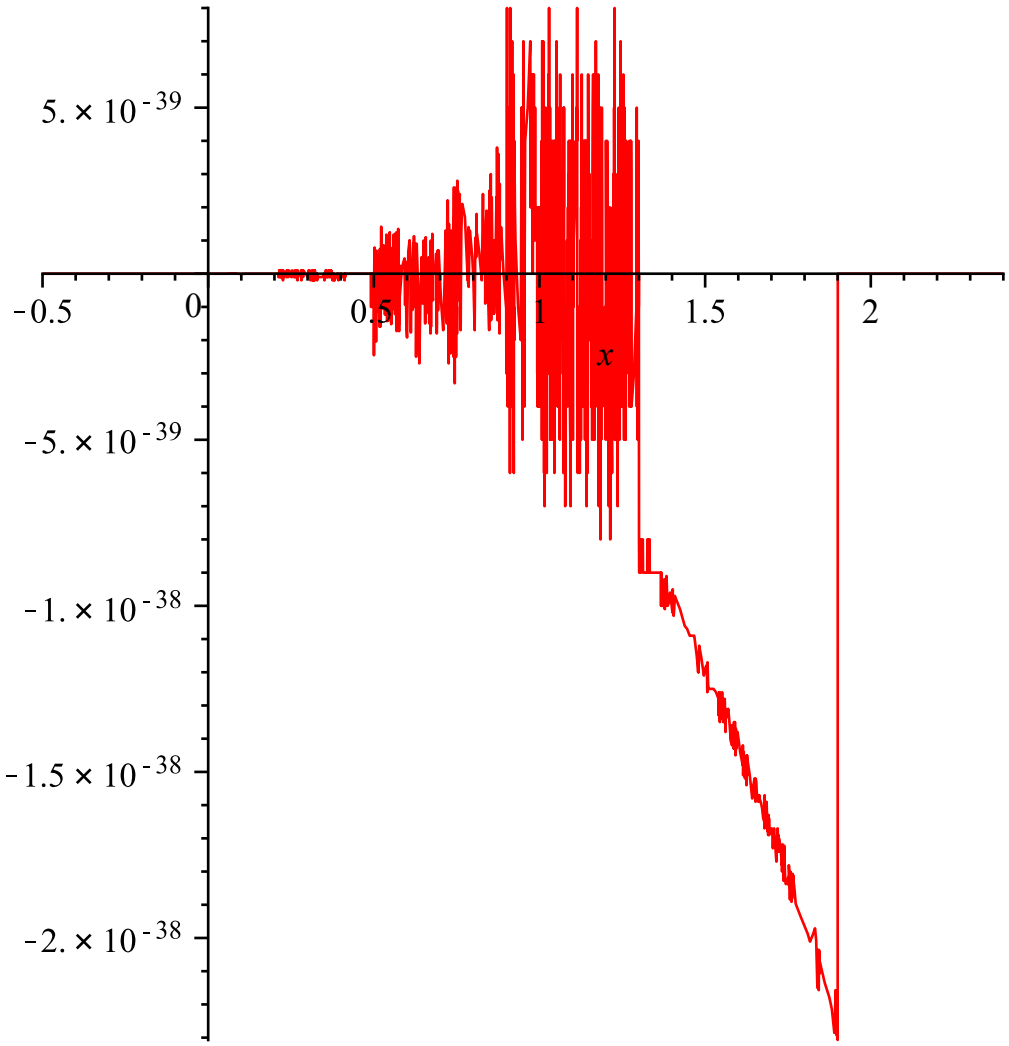
```
> plot(diff(BSpline(4,x,knots=kn),x)-3*(BSpline(3,x,knots=kn1)/1.3-BSpline(3,
  x,knots=kn2)/(1.9-0.5)),x=-0.5..2.4);
```



```
> Digits:=40;
```

$$Digits := 40 \tag{6}$$

```
> plot(diff(BSpline(4,x,knots=kn),x)-3*(BSpline(3,x,knots=kn1)/1.3-BSpline(3,
  x,knots=kn2)/(1.9-0.5)),x=-0.5..2.4);
```



Problem 5.3

```
> restart:
  Digits:=40;
```

$$Digits := 40 \tag{7}$$

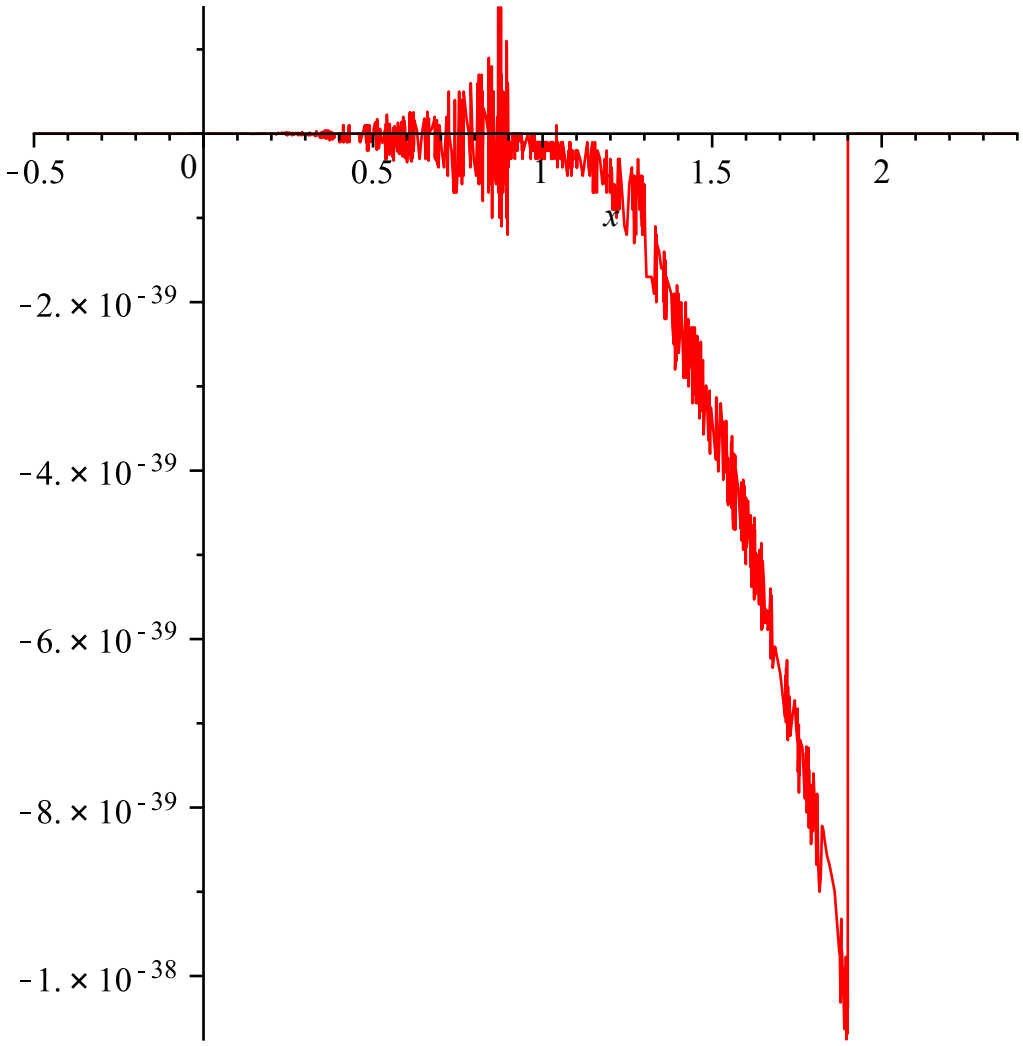
```
> with(CurveFitting):
  kn:= [0,0.5,0.9,1.3,1.9];
  kn1:=[0,0.5,0.9,1.3];
  kn2:= [0.5,0.9,1.3,1.9];
```

$$kn := [0, 0.5, 0.9, 1.3, 1.9]$$

$$kn1 := [0, 0.5, 0.9, 1.3]$$

$$kn2 := [0.5, 0.9, 1.3, 1.9] \tag{8}$$

```
> plot(BSpline(4,x,knots=kn)-(x-0)/(1.3-0)*BSpline(3,x,knots=kn1)-(x-1.9)/
  (0.5-1.9)*BSpline(3,x,knots=kn2),x=-0.5..2.4);
```

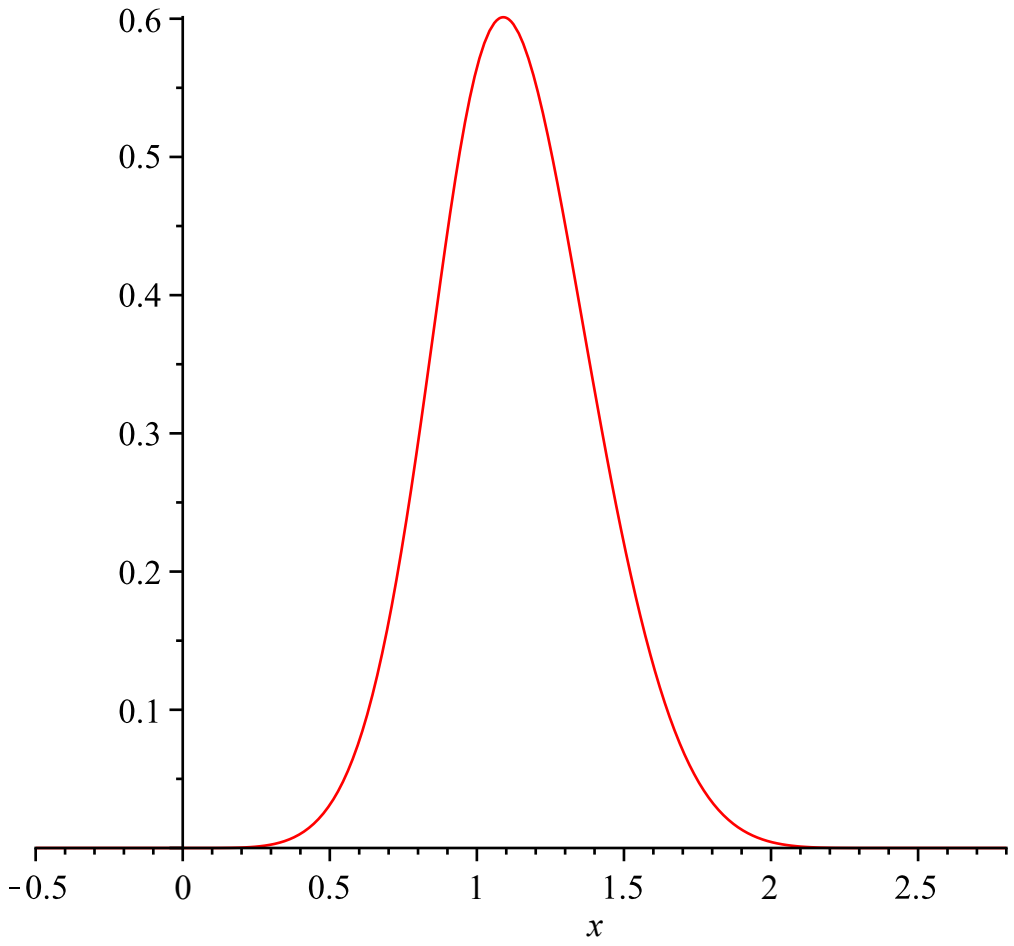


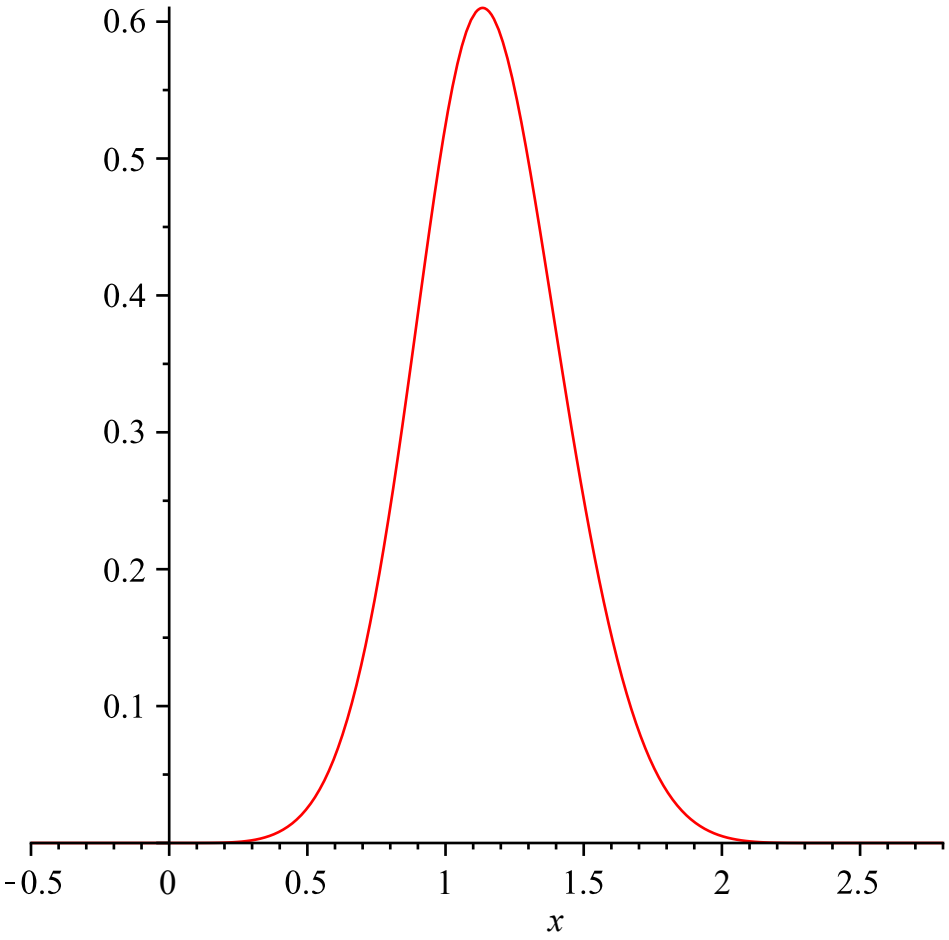
Problem 5.4

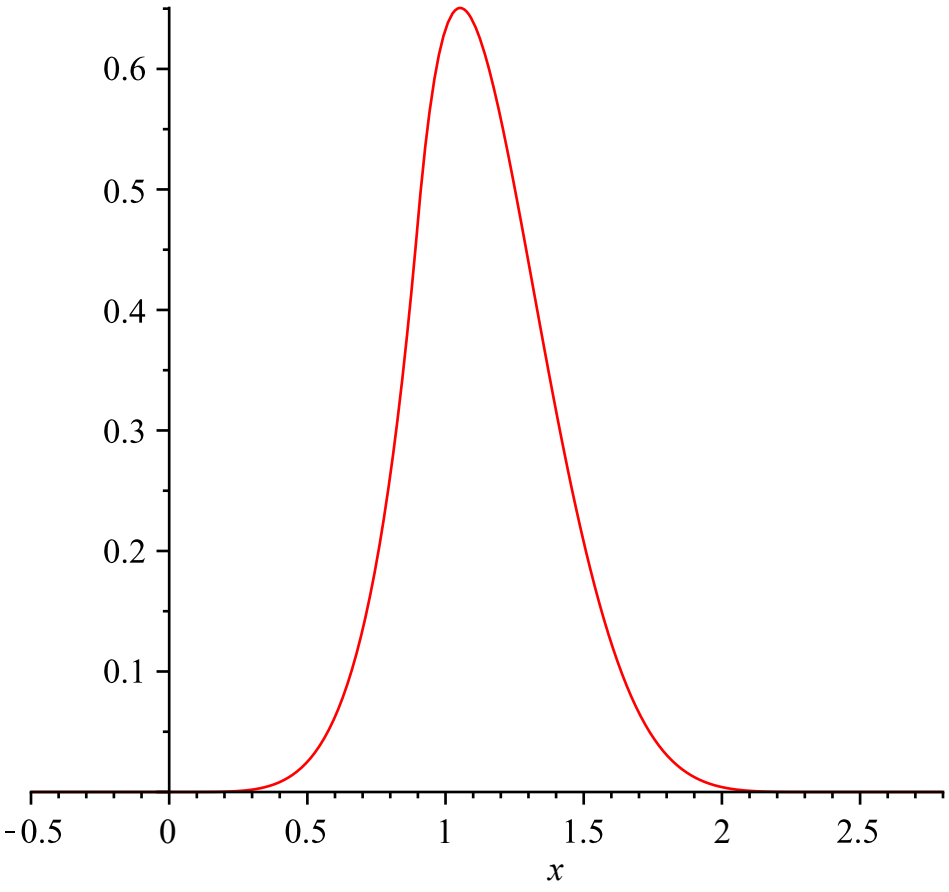
```
> restart:
  #Digits:=40;
> with(CurveFitting):
  kn1:= [0,0.5,0.9,0.9,1.3,1.9,2.4];
  kn2:=[0,0.5,0.9,1.1,1.3,1.9,2.4];
  kn3:= [0,0.9,0.9,0.9,0.9,1.9,2.4];
  kn4:= [0,0.9,0.9,0.9,0.9,0.9,2.4];
```

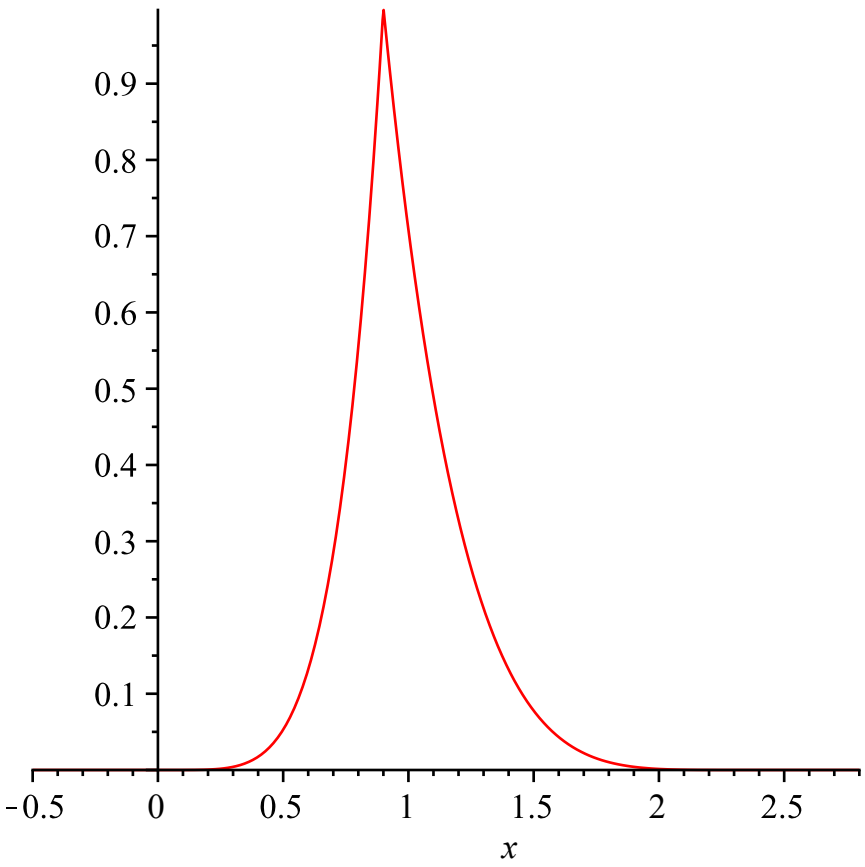
$$kn1 := [0, 0.5, 0.9, 0.9, 1.3, 1.9, 2.4]$$
$$kn2 := [0, 0.5, 0.9, 1.1, 1.3, 1.9, 2.4]$$
$$kn3 := [0, 0.9, 0.9, 0.9, 0.9, 1.9, 2.4]$$
$$kn4 := [0, 0.9, 0.9, 0.9, 0.9, 0.9, 2.4] \quad \textbf{(9)}$$

```
> for j from 1 to 4 do plot(BSpline(6,x,knots=kn||j),x=-0.5..2.8); od;
```




0.6
0.5
0.4
0.3
0.2
0.1
-0.5
0
0.5
1
1.5
2
2.5
x


0.6
0.5
0.4
0.3
0.2
0.1
-0.5
0
0.5
1
1.5
2
2.5
x


0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.5
0
0.5
1
1.5
2
2.5
x

Or all together

```
> plot({BSpline(6,x,knots=kn1),BSpline(6,x,knots=kn2),BSpline(6,x,knots=kn3),
  BSpline(6,x,knots=kn4)},x=-0.5..2.8);
```